# Course Descriptions

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Course Descriptions

Course Numbers, Symbols, and Abbreviations

The courses in this catalog are not offered every semester. To find out whether a course is offered during a particular semester, consult the Class Schedule.

Course Numbers

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 for degree credit. 4xxx courses can be counted for a Graduate School degree if the course is taught by a member of the graduate faculty or an individual appointed to Limited Teaching Status (LTS).
5xxx  Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Department Designators

In conjunction with course numbers, departments and programs are identified by a 2-, 3-, or 4-letter designator prefix (e.g., CE for Civil Engineering, Pol for Political Science, WoSt for Women's Studies). When no department designator precedes the number of a course listed as a prerequisite, that prerequisite course is in the same department as the course being described.

Course Symbols

The following symbols are used throughout the course prerequisites of most University catalogs to denote common and recurring items of information.

! ......................... Work for this course will extend past the end of the term. A grade of K will be assigned to indicate that the course is still in progress.
† ........................ All courses preceding this symbol must be completed before credit will be granted for any semester of the sequence.
§ ........................ 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 the instructor is required for registration.
∆ ........................ Approval of the department offering the course is required for registration.
❏ ........................ Approval of the college offering the course is required for 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.

Abbreviations

The following abbreviations are used throughout the course prerequisites of most University catalogs to denote common and recurring items of information.

QP ..................... Quarter prerequisite. Courses following the QP are quarter courses.
SP ...................... Semester prerequisite. Courses following the SP are semester courses.
cr ....................... credit.
div ..................... division.
DUS .................. Director of Undergraduate Studies.
equiv .................. equivalent.
fr, soph, jr, sr ..... freshman, sophomore, junior, senior.
H ....................... Honors. Courses with an H following the course number satisfy honors requirements.
UC .................... University College.
V ....................... Honors and Writing Intensive. Courses with a V following the course number satisfy both honors and liberal education writing intensive requirements.
W ...................... Writing Intensive. Courses with a W following the course number satisfy the writing intensive requirement for liberal education.

Course Listing Sample

Xology
Xology and Diometrics
College of Liberal Education
Xolo 4101. Methods in Xology. (3 cr; QP–3600 or #; SP–3601 or #)
Historical, numerical, sociological, and Freudian methods of research in xology with applications to contemporary problems.
Course Descriptions

Department of Accounting

Curtis L. Carlson School of Management

Acct 2050. Introduction to Financial Reporting. [4 cr; QP–Completion of 40 credits; SP–Completion of 26 credits; A-F only] Introduction to financial accounting for U.S. organizations. Recording and understanding U.S. financial statements.

Acct 3001. Introduction to Management Accounting. [2 cr; QP–1050; SP–2050; A-F only] Introduction to costing techniques, including activity-based costing. Applying costing methods to determine cost of goods sold, and production processes. Use of costs in operating/strategic decisions.


Acct 3201. Intermediate Management Accounting. [2 cr; QP–3001, acct or finance major; SP–3001, acct or finance major; A-F only] Activity-based costing techniques in specific industries including service firms. Other topics could include costing for just-in-time manufacturing, tracking customer profitability, and costing quality.

Acct 3299. Internship in Management Accounting. [2 cr; QP–Acct 3201, SP–Acct 3201, S-N only] Full-time work in general accounting, cost accounting, or internal auditing in an industrial or governmental organization plus a written report analyzing the work experience.

Acct 5100. Corporate Financial Reporting. [4 cr; QP–Mgmt student, non-accounting major; SP–Mgmt student, non-accounting major; A-F only] Overview of asset/liability valuation and income measurement. Focus on how economic events are reported in the financial statements. Examines accounting theory and the accounting standard-setting process.

Acct 5101. Asset Valuation and Income Determination. [4 cr; QP–Grade of at least B in 1050, [mgmt major or mgmt grad student]; SP–Grade of at least B in 2050, [mgmt major or mgmt grad student]; A-F only] Valuation, measurement, and reporting issues related to selected assets/liabilities of a firm. Theory underlying accounting applications. Applying accounting principles.

Acct 5102. Liability Valuation and Income Determination. [4 cr; QP–[3101 or 5101 or 3010] or [3101 or 5101 or 3010] or [3101 or 5101 or 3010] or [3101 or 5101 or 3010]; A-F only] Extends understanding of the basic valuation problems encountered in financial reporting, focusing on the valuation of liabilities. Covers accounting for leases, pensions, deferred taxes. Introduces consolidated financial statements.

Acct 5125. Auditing Principles and Procedures. [4 cr; QP–[3101 or 3101]; acct major; SP–[3101 or 3101 or 3010]; acct major or grad mgmt student; A-F only] Auditing financial information systems. Independent audits and internal auditing. Ethics. Legal responsibilities.

Acct 5126. Internal Auditing. [2 cr; QP–3010 or 5101; SP–[3101 or 5101 or 5100 or 5100]; A-F only] Financial and operational auditing. Standards. Managing the function.

Acct 5135. Fundamentals of Federal Income Tax. [4 cr; QP–1050 or 8030 or 8130, mgmt grad student; SP–2050, mgmt or grad mgmt student; A-F only] Introduction to the U.S. federal system of taxation. Concepts of gross income, deductions, and credits. Analysis of the Internal Revenue Code and its provisions with respect to specific areas of the law. Examination of the interrelationships between legislative, judicial, and administrative authority. Introduces the various methods, tools and techniques to conduct tax research.


Acct 5160. Financial Statement Analysis. [2 cr; QP–[3101 or 5101 or 3010]; accounting or finance major; SP–[5100 or 5101 or 3101]; accounting or finance major; A-F only] Interpretation/analysis of financial statements. Introduces basic techniques of financial statement analysis and applies them in different settings (e.g., in investment/credit decisions).

Acct 5180. Consolidations and Advanced Reporting. [2 cr; QP–[5102, mgmt or grad mgmt student; SP–5102, mgmt or grad mgmt student; A-F only] Theory underlying the preparation of consolidated financial statements, as well as the mechanical computations needed to prepare the statements themselves.

Acct 5200. Tax Accounting Methods and Periods. [4 cr; QP–MBT student; 5135; SP–MBT student; 5135; A-F only] Rules affecting timing of income and deductions for tax purposes. Examination of cash and accrual accounting methods on an overall basis and with respect to individual accounts and deductions; rules for changing accounting methods and periods; annual accounting and transactional concepts, including the claim of right doctrine, the Arrowsmith doctrine, and the flow-through doctrine.

Acct 5220. Tax Research, Communication, and Practice. [4 cr; QP–MBT student; 5135; SP–MBT student; 5135; A-F only] In-depth treatment of tax research methodology including tax questions, locating potential authority, assessing potential tax consequences, and communicating research results. Substantive material on dealing with the IRS including sources of IRS policy; processing returns, auditing returns; rulings and determination letters; closing agreements; assessments and collections.

Acct 5230. Corporate Taxation I. [2 cr; QP–MBT student; 5135; SP–MBT student; 5135; A-F only] Federal income taxation of corporations and shareholders. Organization of a corporation; establishment of its capital structure; determination of its tax liability; dividends and other nonliquidating distributions; stock redemptions, and liquidations.

Acct 5236. Introduction to Taxation of Business. [2 cr; QP–5135, acct major; SP–5135, acct major; A-F only] Introduction to the tax laws governing the taxation of corporations, partnerships, limited liability companies, limited liability partnerships, and S corporations. Students will also increase their knowledge and skills related to tax research by writing research memorandums.

Acct 5271. Accounting Information Systems. [2 cr; SP–3101 or 5101 or 5100 or 5100] Applications of electronic data processing systems in accounting, including modeling, financial planning, auditing, and data security. Analysis/design of accounting information systems.

Acct 5281. Special Topics in Financial Reporting. [2 cr; QP–5102, mgmt or grad mgmt student; SP–5102, mgmt or grad mgmt student; A-F only] Covers areas of financial reporting frequently covered on the CPA exam, including partnerships, foreign operations, and accounting for government and nonprofit organizations.

Acct 5310. International Accounting. [2 cr; QP–1050, mgmt student; SP–2050, mgmt student; A-F only] Review of macroeconomic concepts of international economics, including trade, international markets for capital and the role of accounting. Survey of different accounting policies and approaches among nations. Reading and understanding financial statements produced in countries other than the United States.

Acct 5320. Current Topics in Accounting. [2 cr; QP–5102, acct major; SP–5102, acct major; A-F only] Topics vary.

Acct 5325. Advanced Tax Principles. [2 cr; QP–5135, MBT student; SP–5135, MBT student; A-F only] In-depth coverage of issues involving all tax entities, focusing on topics pertaining to individuals and partnerships: at-risk provisions, passive activity loss rules, Alternative Minimum Tax/AMT credit for individuals, tax benefit allocation claim of right doctrine, like-kind exchanges of personal property, net operating losses, hobby losses, and business/rental use of residences.

Acct 5330. Taxation of Corporations II. [2 cr; SP–5230, MBT student; A-F only] Corporate readjustments related to multiple corporations and consolidated returns.

Acct 5333. Tax Aspects of Consolidated Returns. [2 cr; SP–5230, MBT student; A-F only] Covers aspects of filing consolidated federal income tax returns. Includes determining affiliated groups; retained life estate transfers; transfers taking effect at death; revocable transfers; joint interest; powers of appointment; valuation problems; expenses, debts and taxes; charitable bequests, marital deduction, taxable inter vivos gifts, splitting and credits.


Acct 5350. Taxation of Estates and Gifts. [2 cr; QP–5135, MBT student; SP–5135, MBT student; A-F only] Taxation of transfers under federal estate and gift tax laws. Includes property owned by the decedent; retained life estates; transfers taking effect at death; revocable transfers; joint interest; powers of appointment; valuation problems; expenses, debts and taxes; charitable bequests, marital deduction, taxable inter vivos gifts, splitting and credits.

Acct 5351. Estate Planning. [2 cr; QP–5135, MBT student; SP–5135, MBT student; A-F only] Addresses various topics related to planning the transfer of property during lifetime and at death.

Acct 5353. Income Taxation of Fiduciaries. [2 cr; QP–5135, MBT student; SP–5135, MBT student; A-F only] Simple, complex, and revocable trusts; estates; accumulation distributions, income in respect of decedents; trust accounting income and principal; distributable net income; terminations; and excess distributions.

Acct 5356. Taxation of Compensation Arrangements. [2 cr; QP–5135, MBT student; SP–5135, MBT student; A-F only] Federal income taxation of corporate deferred compensation and fringe benefits with emphasis on pension plans, profit sharing plans, stock option plans, individual retirement accounts, annuities and insurance, medical related compensation benefits, and reporting requirements.

Acct 5360. State and Local Taxation. [2 cr; QP–5135, MBT student; SP–5135, MBT student; A-F only] Examines state levying of individual income, corporate income, property, sales, and excise taxes. Tax problems of businesses with multistate operations.

Acct 5370. Taxation of Property Transactions. [2 cr; QP–5135, MBT student; SP–5135, MBT student; A-F only] Determining realized gain or loss and recognized gain or loss, and tax treatment of that gain or loss on property dispositions. Consequences of property transactions including depreciation, depletion, basis, and capital gains problems.
AdEd 5201. Introduction to Adult Literacy. (3 cr) Definitions of literacy, workplace and family. Issues: poverty, welfare, ethnic diversity, social class, language and learning, immigrants. Review of literacy programs, funding, and professionalization. Reaching and recruiting undereducated adults. The role of the family and social factors.

AdEd 5202. Assessment of Adult Literacy. (3 cr) Assessment of adult literacy problems as they affect work force, family and community. Setting educational goals; formal versus informal assessment; case studies; educational planning.


AdEd 5302. Continuing Education for Professionals. (3 cr) Analysis of philosophies, issues, policies, trends, professional needs and statutory requirements in continuing professional education programs. Role of the program director and organization.

AdEd 5303. Working with Volunteers in Community Settings. (3 cr) Uses collaborative, experiential methods to address fundamental issues and practices in volunteer development. Exploring values, roles, strategies, staff and key issues and trends in the administration of volunteer programs.

AEM 2301. Mechanics of Flight. (3 cr; QP–IT student, Math 1261, Phys 1252 or δ, SP–IT student, Math 1272, Phys 1250 or δ) Standard atmospheric properties; basic aerodynamics; generation of lift and drag; airfoils and finite wings; elements of airplane performance, design and atmospheric flight mechanics; wind tunnel experiments; experimental determination of lift and drag. Introduction to MatLab.


AEM 4001. Workshop: Elementary and Secondary Teachers. (3 cr; QP–Education major, in-service teacher [documentation required], A limited to 30 students; SP–Education major, in-service teacher [documentation required], A limited to 30 students) Lectures, film reviews, construction and demonstration of classroom aids, involvement with the NASA spacetrike, flight experience, field trips covering topics such as space shuttle, model rocketry including a launch, astronaut in space, principles of flight, conventional aircraft, space age education tools. Visits to local aerospace facility and to major aerospace installation (subject to availability of airlift).

AEM 4201. Fluid Mechanics. (4 cr; QP–IT upper div or graduate student, 3036, Math 3252, Math 3261 or δ; SP–IT upper div or grad, 2012, Math 2243, Math 2263; A-F only) First course in fluid mechanics. Includes stress and strain rate descriptions, fluid statics, use of differential and finite control volume analysis with continuity, momentum and energy equations, Bernoulli and Euler equations; vorticity, potential flow, incompressible viscous flow using Navier-Stokes equations, dimensional analysis, pipe flow, boundary layers, separation, introduction to turbulence.

AEM 4202. Aerodynamics. (4 cr; QP–Upper div or grad, 5200 or δ, SP–Upper div or grad, 4201) Inviscid aerodynamics. Subsonic, transonic, and supersonic airfoil theory; wing theory. Introduction to compressible flow, normal and oblique shock waves, Prandtl-Meyer expansions, Linearized compressible flow. Wing-body combinations. Computational aerodynamics methods.

AEM 4203. Aerospace Propulsion. (4 cr; QP–IT upper div or grad, 5250, ME 3301 or δ; SP–IT upper div or grad, 4202, ME 3324) Basic gas-dynamics, single and multi-stage chemical rockets, liquid and solid propellants. Performance analysis of inlets and exhaust nozzles, compressors, burners, turbines. Rocket flight performance, single- and multi-stage chemical rockets, liquid and solid propellants. Homework includes design problems. Design project with technical report.

AEM 4243. Advanced Aerodynamics. (3 cr; QP–IT upper div or grad, 5206 or δ; SP–IT upper div or grad, 4202) Interaction between pressure distribution and boundary-layer growth on airfoils of arbitrary shape. Inviscid flow past non-planar wings of specified planform.
AEM 4245. Hypersonic Aerodynamics. (3 cr; QP–Upper div or grad, 5204 or Δ, SP–Upper div or grad, 4202) Impacts and applications of hypersonic flow. Hypersonic shock and expansion-wave relations. Local surface inclination methods. Approximate and exact methods for hypersonic inviscid flow fields. Visual flow patterns, aerodynamic heating, hypersonic viscous interactions, computational methods. Hypersonic propulsion and vehicle design.

AEM 4251. Computational Fluid Mechanics. (3 cr; QP–IT upper div or grad, 5200, 5300 or #; SP–IT upper div or grad, 4201 or equiv, CSci 1107 or equiv) Introduction to computational fluid mechanics with emphasis on finite element method, fundamentals of spatial discretization, numerical time-integration. Introduction to engineering and scientific computing environment and large-scale computing.


AEM 4303. Flight Dynamics and Control. (3 cr; QP–IT upper div or grad, 3005, or #; SP–IT upper div or grad, 3201, or #) Reference frames, kinematics, equations of motion for a rigid body. Forces and moments, trim, linearization, dynamic response characteristics for aircraft and spacecraft. Aircraft stability derivatives, state-space methods, control system analysis, stability. Handling qualities. Phugoid, short period, spiral, roll subsidence, dutch roll modes, approximations, transfer functions. Use of MatLab for dynamic analysis. Design project.

AEM 4311. Automatic Control Systems. (4 cr; QP–IT upper div or grad, 5200, or equiv or #; SP–IT upper div or grad, 4030 or equiv) Analysis and synthesis of automatic control systems. Transfer functions. Root locus, Nyquist and Bode techniques. Introduction to state space formulation. Applications, design project, lab.

AEM 4331. Aerospace Vehicle Design I. (3 cr; QP–AEM 5226 or #, [EngC 1101 or equiv] SP–4553 or #, [EngC 1101 or equiv]) Students work in teams to design aerospace vehicle: minimum requirements, design rules, sizing/weight estimates, CAD/vehicle integration, propulsion, systems/equipment, operating envelope, stability/control, specification, certification/ethics. Written report, oral presentation.

AEM 4332W. Aerodynamic Vehicle Design II. (4 cr; QP–5326 or #, [EngC 1101 or equiv] SP–4553 or #, [EngC 1101 or equiv]) Students design aerospace vehicle: schedules/milestones/critical-path, trade studies, weight/balance, propulsion, trajectory/controls/CAD, vehicle integration, drawings/specifications, fabrication with CAD/CAM, test matrix, structural analysis/test, stress/strain/displacement measurements, wind tunnel/water channel test, flight test, certification/ethics. Student written report, oral presentation. Writing-intensive.

AEM 4351. Aerodynamic Decelerator Systems. (3 cr; QP–IT upper div or grad, 3036, 5300 or #; SP–IT upper div or grad, 2012, 2031) Parachutes and other aerodynamic decelerators. Types, characteristics, performance; drag coefficients and steady descent; stability, deployment, opening forces; apparent mass effects; trajectory analysis; stress analysis; engineering properties of textile materials. Design project.

AEM 4371. Helicopter Aerodynamics. (3 cr; QP–IT upper div or grad, 5206 or #; SP–IT upper div or grad, 4020) Review basic aerodynamics, unique features of helicopters, momentum theory in axial flight and rotor flow states, momentum theory in non-axis flight, blade-element theory, simple rotor control, vortex theory. Design project.

AEM 4441. Structural Dynamics. (3 cr; QP–IT upper div or grad, 3401, 3016 or #; SP–IT upper div or grad, 4301, 3031) Frequency and time domain analysis of multi-degree of freedom mechanical systems; natural frequencies and normal modes of vibration; free and forced vibrations of strings, rods, shafts beams; Introduction to finite elements in structural dynamics. Design project.

AEM 4495. Problems in Dynamics and Control. (1-3 cr [max 6 cr]; QP–Δ, SP–A, Δ) Topics of current interest. Individual projects with consent of faculty sponsor. AEM 4501. Aerospace Structures. (3 cr; QP–IT upper div or grad, 3016 or equiv or #; SP–IT upper div or grad, 3031 or equiv or A-F only) Advanced strength of materials analysis of elastic structures with aerospace applications; failure modes and failure analysis. Solid Stress design; plane truss design; energy and Castigliano methods for statically determinate and indeterminate structures; torsion and bending of asymmetrical thin-walled sections. Design project.

AEM 4502. Computational Structural Analysis. (3 cr; QP–IT upper div or grad, C or better in 5515 or #; SP–IT upper div or grad, C or better in 4501 or #) Use of computer programs for both microcomputers and workstations to solve moderately sized problems of analysis and design of trusses, plane frames, torsion, plane stress, combination structures; elastic and inelastic analysis; use of symmetry and superposition to yield power of prepared programs; basis of the finite element methods used.

AEM 4511. Mechanics of Composite Materials. (3 cr; QP–IT upper div or grad, 3016 or #; SP–IT upper div or grad, 3031) Analysis, design, applications of laminated and sandwiched composite. Use of MatLab for analysis. Design project.

AEM 4601. Instrumentation Laboratory. (3 cr; QP–IT upper div or grad, EE 3005, EE 3006, EE 3009, CSci 3101 or #; SP–IT upper div or grad, EE 3005, EE 3006, CSci 1107) Introduction to lab instrumentation; computerized data acquisition; statistical analysis of data; time series data and spectral analysis; transducers for measurement of solid, fluid, dynamical quantities. Design of experiments.

AEM 4620W. Aeromechanics Laboratory. (4 cr; QP–IT upper div or grad, 5200, 5315, [EngC 1101 or equiv] or #; SP–IT upper div or grad student, 4201, 4601, [EngC 1101 or equiv]) Experimental methods/design in fluid/solid mechanics. Wind tunnel/water channel experiments with flow visualization, pressure, velocity, force measurements. Measurement of stresses, strains, displacements in solids/structures, including stress concentrations, aeropace materials behavior. Structural dynamics. Computerized data acquisition/analysis, error analysis, data reduction. Experiment design. Lab. Reports, Writing-intensive.

AEM 4651. Aeroelasticity. (3 cr; QP–IT upper div or grad, 3401, 5206 or #; SP–IT upper div or grad, 4301, 4202) Static aeroelastic phenomena, torsional divergence of a lifting surface, control surface reversal; aeroelastic flutter, unsteady aerodynamics; problems of gust response, buffetting. Design project.

AEM 4681. Introduction to Acoustics. (3 cr; QP–Phys 3254, Math 3252, IT upper div or grad student or #; SP–IT upper div or grad student) Derivation of the wave equation, plane wave solution, transmission and reflection at boundaries, resonators and mufflers, three dimensional wave propagation, properties of environmental noise sources, hearing and perception of sound, acoustic properties of rooms, lab experience in sound and noise measurements, noise control techniques.

AEM 4796. Summer Engineering Employment. (1-3 cr [max 6 cr]; QP–IT upper div, AEM major, written proposal, SP–IT upper div, AEM major, written proposal, A) Summer work (at least 360 hours per summer) with a substantial engineering experience. Written report.

AEM 4821. Aerospace Engineering and Mechanics Honors Thesis I. (3 cr; QP–Upper div AEM honors student, A; SP–Upper div AEM honors student) Individual projects under direction of AEM faculty member.

AEM 4822W. Aerospace Engineering and Mechanics Honors Thesis II. (3 cr; QP–Upper div AEM honors student, A; SP–Upper div AEM honors student) Individual projects under the direction of AEM faculty member.


AEM 5401. Intermediate Dynamics. (3 cr; QP–IT upper div or grad, 3036, Math 3261, SP–IT upper div or grad, 2012, Math 2243) Three-dimensional Newtonian mechanics, kinematics of rigid bodies, dynamics of rigid bodies, generalized coordinates, holonomic constraints, Lagrange equations, applications.

AEM 5501. Continuum Mechanics. (3 cr; QP–IT upper div or grad, AEM 3016, Math 3261, or #; SP–IT upper div or grad, 3031, Math 2243 or equiv or #) Concepts common to all continuous media: elements of tensor analysis; motion, deformation, vorticity; material derivatives; mass, continuity equation; balance of linear, angular momentum; geometric characterization of stress; constitutive equations.

AEM 5503. Theory of Elasticity. (3 cr; QP–IT upper div or grad, 5515 or equiv, Math 3252, SP–IT upper div or grad, Math 2263 or equiv or #A-F only) Introduction to the theory of elasticity, with emphasis on linear elasticity. Linear and nonlinear strain measures, boundary-value problem for linear elasticity, plane problems in linear elasticity, three dimensional problems in linear elasticity. Topics from nonlinear elasticity, micromechanics, contact problems, fracture mechanics.
Course Descriptions

Air 1105. Introduction to the Air Force Today II. (1 cr; A-F only)
Structure and missions of Air Force organizations. Communication skills, How cadets are selected for the Professional Officer Course, categorization into specific career areas (pilot and navigator) occurs in the AFROTC junior year, and selection for specific career fields is made in a cadet’s senior year.

Air 1204. History of Airmanship and Communication Skills. (1 cr; A-F only)
Air Force heritage and leaders, Quality Air Force, and introduction to ethics and values, introduction to leadership, group leadership problems, and continuing application of communication skills.

Air 1205. Quality Air Force, Group Leadership Problems, and Presentation Techniques. (1 cr; A-F only) Leadership and followship. Offerership, ethics, and values; Air Force’s core values. Air Force heritage and leaders. QL problems and continuing application of communication skills.

Air 3301. Air Force Leadership, Quality, and Communication. (3 cr; A-F only)
Study of leadership, quality management fundamentals, and communication skills required of an Air Force junior officer. Case studies.

Air 3302. Air Force OfficerShippership, Quality, and Communication. (3 cr; SP–3301 recommended; A-F only) Focus on completing Quality Air Force training, learning the GQF Retal Development system, exploring leadership styles, ethics, core values, character development, and standards of conduct. Improve written and oral communication skills. Case studies.

Air 3401. National Security Policy. (3 cr; A-F only) National security process, regional studies, advanced leadership ethics, Air Force doctrine, and military justice. Military as a profession, officership, civilian control of the military, preparation for active duty, and current issues affecting military professionalism. Focus on refining communication skills.

Air 3402. Preparation for Active Duty. (3 cr; A-F only) National security process, regional studies, advanced leadership ethics, and Air Force doctrine. Military law, current issues affecting military professionalism, and preparation for active duty as a second lieutenant in the U.S. Air Force.

Afro-American Studies (Afro)

Department of Afro-American Studies
College of Liberal Arts

Afro 1011. Introduction to African American Studies. (3 cr)
The study of peoples of African descent including the evolution of African American culture, comparative race relations, feminism and social policy change.

Afro 1021. Introduction to Africa. (3 cr) Diverse themes and disciplines in African Studies from prehistory to post-colonial period. Introduction to methodologies of inquiry.

Afro 1221. Beginning Swahili. (4 cr)
Introduction to basic skills: comprehension, speaking, reading and writing.

Afro 1222. Beginning Swahili. (4 cr; SP–1221 or equiv) Continuation of skill development from 1221.

Afro 3001. West African History: Early Times to 1800. (3 cr) West Africa from late prehistoric times to establishment/histories of states. Relations with North African, Mediterranean, Asian, and American worlds. Examines non-centralized patriarchal authority.

Afro 3002. West African History: 1800 to Present. (3 cr) West African history from late-18th century to present. Themes include study of continuities with the past and profound changes including new 19th century state formation, European colonialism, and post-colonial issues.


Afro 3072. Racism: Social and Psychological Consequences for Black Americans. (3 cr) Racism and its effects on African Americans; definitions, determinants, and dynamics. Examined in an experiential context to reflect individual and institutional racism.

Afro 3108. Black Music: A History of Jazz. (3 cr) The development of jazz in America and in the world, with special emphasis given to the roots or jazz in the African American experience.

Afro 3141. Africa. (3 cr) Regional differentiation of human groups and environments; cultural contact and problems of underdeveloped countries south of the Sahara.

Afro 3204. History of South Africa to 1910. (3 cr) Introductory survey of the history of South Africa from early humans to the arrival of the first Dutch settlers at the Cape of Good Hope in 1652 to the formation of the Union of South Africa in 1910.

Afro 3205. History of South Africa from 1910. (3 cr) The history of South Africa from the Union to the present. Focus on such issues as African and Africaner nationalism, structures of apartheid, forced population removals, divestment and sanctions, and the post-apartheid era.

Afro 3225. Third Semester Swahili. (4 cr; SP–1 yr Swahili or equiv) Readings of contemporary Swahili texts. Review of grammar and complex verb forms, building vocabulary and communication skills.

Afro 3226. Fourth Semester Swahili. (4 cr; SP–3225 or equiv) Advanced Swahili readings, speaking, and writing practice.

Afro 3251W. Sociological Perspectives on Race, Class, and Gender. (3 cr; A-F only) Race, class, ethnicity, and gender, and as aspects of social identity and as features of social organization. Experiences of women of color in the United States. Family life, work, violence, sexuality/reproduction, possibilities for social change.

Afro 3301. The Music of Black Americans. (3 cr) Musical contributions of African American artists and innovators from 1619 to the present. Musical genres explored include spirituals, blues, ragtime, gospel, art music, and jazz.

Afro 3334. Black Women: Interdisciplinary Perspectives. (3 cr) Interdisciplinary study of the experience of African American women, including economic, political, and social factors, psycho-social development, and family roles.

Afro 3421. History of Africa to 1800. (4 cr) Socioeconomic, political, and cultural development in precolonial Africa from ancient Egypt through the era of the trans-Atlantic slave trade.

Afro 3422. History of Africa: 1800 to Present. (4 cr) Socioeconomic, political, and cultural development in Africa from the abolition of the trans-Atlantic slave trade through the postcolonial era.

Afro 3543. Psychology and the Black American Experience. (3 cr) Historical and contemporary perspectives of the relationship between the area of psychology and African American life and experience.

Afro 3591. Introduction to African American Literature. (3 cr) Afro-American autobiography, fiction, essay, poetry, drama, and folklore from the late-18th century to the present.

Afro 3592. Introduction to Black Women Writers in the United States. (3 cr) The literature of African American women writers explored in novels, short stories, essays, poetry, autobiographies, and drama from the 18th to the late-20th century.

Afro 3601. Introduction to African Literature. (3 cr) Oral and written literature of the 19th and 20th centuries. Emphasis on literature written in English and French. All readings in English.


Afro 3634. African Cinema. (3 cr) Films by African filmmakers from West, Central, and Southern Africa. Aesthetic, theoretical, and sociocultural issues will be explored through class screenings and critical readings.

Afro 3741. Racial Minorities and the Mass Media. (3 cr; QP–Jour majors must have course approved on program plan; pre-jour should not enroll; A-F only) Past and present depictions of minority individuals and groups in movies, literature, radio/TV, etc., as seen against anthropological, psychological, and sociological knowledge and experience. Emphasis on personal and political effects of media depictions.

Afro 3864. African American History: Slavery to Reconstruction. (3 cr) Importance of the dynamics of class, gender, region, and political ideology, as well as the changing nature of race and racism.

Afro 3865. African American History Survey: 1800 to Present. (4 cr; SP–Hist 3865) Internal migrations, industrialization/unification, the Great Depression, world wars, large scale movements for social/political change.

Afro 3910. Topics in Afro-American and African Studies. (3 cr; max 9 cr) Introduction to literature/cultures of women of African descent writing from Europe, Africa, the Caribbean, the United States. Migration, postcolonial debates, race, class/gender. Readings may include works by Grace Nichols, Jamaica Kincaid, Michelle Cliff, Alice Walker, Matamba Ba.


Afro 3992. Directed Study. (1.3 cr; SP–A, A–D) Guided individual research and study.

Afro 4001. Seminar: History of Women in South Africa. (3 cr) The changing role and status of women in South Africa from precolonial era to the present, and relationships to political, social, and economic development.


Afro 4231. The Color of Public Policy: African Americans, African Indians, and Chicanos in the United States. (3 cr) Examination of structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporary communities of color in the United States.

Afro 4302H. Honors: Women's Autobiographical Narratives. (2 cr; SP–); not enroll; A-F only) Focus is on literary autobiography, journals, travel narratives, essays, slave narratives, testimonial and ethnographies to consider the content and the methodological theoretical, and aesthetic issues of the construction and production of women’s experience.
Course Descriptions

Afro 4432. Colloquium: Before the Field: Internships, Community Service, and Study Abroad. (3 cr)
Thesis and practical preparation for internships, community work, and study abroad.

Afro 4622. Caribbean Writers and Identity. (3 cr)
Examination of literary and historical issues explored by Caribbean writers in English, French, and Spanish-speaking Caribbean through autobiographies, short stories, novels, and films.

Afro 4832. Black Francophone Writers in Translation. (3 cr)
Exploration of ideas, particularly negritude and issues of creolization, central to male and female writers in French from Africa and the Caribbean. Novels, essays, short stories, and films.

Afro 4800. African Studies Seminar. (3 cr)
Topics vary and reflect researcher’s interest. Topics specified in Class Schedule.

Afro 4900. Afro-American Studies Seminar. (3 cr)
Topics specified in Class Schedule.

Afro 5072. Racism: Social and Psychological Consequences for Black Americans. (3 cr)
Racism and its effects on African Americans: definitions, determinants, and dynamics. Examined in an experimental context to reflect individual and institutional racism.

Afro 5143. Geography of West Africa. (3 cr)
West Africa from Senegal to Cameroon. Social geography of resource use, population settlement, economic development, and international relations.

Afro 5145. Development in Africa. (3 cr)
Economic, political, and social development in Africa from independence to the present, emphasizing the reordering of colonial landscapes, bases for North–South relations, big power interventions, and participation in the world economy.

Afro 5181. Blacks in American Theater. (3 cr)
Historical survey of significant events in the development of American black theater traditions. Essays, plays, playwrights, and theaters from early colonial references to the Black Arts Movement.

Afro 5182. Contemporary Black Theater: 1960 to Present. (3 cr)
Essays, plays, playwrights, and theaters that contribute significantly to contemporary black theater. Focus on the development of the Black Arts movement to the present.

Afro 5191. Seminar: The African American Experience in South Africa. (3 cr)
Idiological, political, religious, and cultural ties that have transformed African American and black South African relations from late-18th century to the present.

Afro 5301. The African Novel. (3 cr; SP–Grad or #)
The novel in contemporary Africa in English, French and African languages. Non-English language works in translation.

Afro 5352. Black Families in Comparative Perspective. (3 cr)
Cross-cultural perspectives of family formation, social structure, and gender patterns of families of African descent.

Afro 5401. Field Studies in Afro-American and African Studies. (1-6 cr; SP–Major or minor, #)
Supervised field study/internship focused on Afro-American and/or African culture(s), language(s), and development.

Afro 5551. Methods: Use of Oral Traditions as Resources for History. (3 cr)
Use of spoken information through time as a source for writing history. Use of canons of history to analyze and critique oral traditions and integrate them into written history.

Afro 5593. The Afro-American Novel. (3 cr)
Contextual readings of 19th- and 20th-century black novels, including Chesnut, Hurston, Wright, Baldwin, Petry, Morrison, and Reed.

Afro 5597. Seminar: Harlem Renaissance. (3 cr)
A multidisciplinary review of the Jazz Age’s Harlem Renaissance: literature, popular culture, visual arts, political journalism, and major black and white figures.

Afro 5598. Seminar: Black Arts Renaissance, 1960s and 1970s. (3 cr)

Afro 5565. African American Cinema. (3 cr)
Exploration of African American cinematic achievements, from the silent films of Oscar Micheaux through contemporary Hollywood and independent films, using class screenings and critical readings.

Afro 5701. Proseminar: Classic Works in Afro-American Studies. (3 cr)
Exploration of classic works in Afro-American studies; conceptual frameworks; multidisciplinary focus.

Afro 5702. Proseminar: Major Figures in Afro-American Studies. (3 cr)
In-depth examination of major figures from various fields in Afro-American studies; bio-critical focus.

Afro 5741. Minorities and the Mass Media. (3 cr; SP–our major or minor, #)
Examination of issues including slavery, Reconstruction, the Great Depression, and civil rights movement using cultural and intellectual history and autobiography/biography. Focuses on dynamics of race, gender, class, region, sexuality, and religion.

Afro 5865. Proseminar: African-American History. (3-4 cr; SP–#)
Examination of issues including slavery, Reconstruction, the Great Depression, and civil rights movement using cultural and intellectual history and autobiography/biography. Focuses on dynamics of race, gender, class, region, sexuality, and religion.

Afro 5876. Proseminar: Approaches to African Development. (3 cr)
Study, critical analysis, and comparison of primary documents relevant to African development.

Afro 5910. Topics in Afro-American and African Studies. (3 cr; [max 9 cr])
Topics specified in Class Schedule.

Afro 5993. Directed Study. (1-3 cr; SP–Grad) Guided individual reading/study for qualified seniors and graduate students.

AFEE 2051. Current Technical Competencies. (3 cr)
Prepares agricultural education teachers and other agricultural professionals to use technology. Develops basic skills and knowledge to plan, implement, operate, and maintain agricultural structural and mechanical systems. Examines learning principles and applied problem solving.

AFEE 2096. Professional Practicum in Agricultural Education: Early Experiments. (3 cr; AF–F only)
Observe schools, extension offices, and agricultural oriented businesses to learn about the work and workplaces in agricultural education.

AFEE 3096. Experiential Learning: Production and Business. (1-8 cr; [max 12 cr]; SP–AgEd major, #)
Experiential learning in the agricultural production and business. Planned, organized, monitored, and evaluated based on a per-experience diagnosis of learning prerequisite to higher level courses in technology and management.

AFEE 3112. Technical Drawing and Production Technologies. (3 cr; AF–F only)
Experiences in technical drawing, design technology, and production technologies related to construction and manufacturing. Develops manipulative skills and techniques; understands principles and processes of technologies through hands-on work in a multiple activity laboratory.

AFEE 3121. Communication, Energy and Power, Transportation and Machinery Technologies. (3 cr; AF–F only)
Experiences in communication, information, energy, power, and transportation technologies. Fundamentals of mechanical, fluid, and electrical power; transportation of people and materials; and technology systems for information and communication, including graphic communication and computer applications. Multiple-activity laboratory.

AFEE 4096. Practicum: Agricultural Education Technology. (1-3 cr; [max 6 cr])
Individualized study packages addressing technology in agriculture production, horticulture, natural resource, biotechnology, farm and agribusiness, management, agricultural science, agriculture-mechanics, youth organizations, adult and beginning farm and agribusiness management.

AFEE 4221. Rural Leadership Development. (3 cr)
Understanding the role, function, and features of leadership in rural communities; importance of personal involvement, preparation, leadership qualities, and vision for individuals and rural community organizations.

AFEE 5111. Agricultural Education: Methods of Teaching. (4 cr)
Use of teaching resources; principles of teaching and learning; problem-solving techniques, lesson plan construction for large group, small group and individual investigations; student management; and assessment.

AFEE 5112. Agricultural Education Program Organization and Curriculum for Youth. (4 cr)
Development of community school program in agriculture, agribusiness, and environmental science that meet graduation outcomes and determine student needs. Use classroom, field, and supervised agricultural experiences to develop activities.

AFEE 5113. Adult Agricultural Education Program Development and Technology. (3 cr; AF–F only)
Organization and implementation of education programs for farmers, farm managers, and agribusiness personnel using community and environmental resources, agricultural and instructional technology, and management information systems to attain family and business goals.

AFEE 5114. Agricultural Education Teaching Seminar. (1 cr)
Reflective learning on teacher preparation experience; identify issues and problems facing the discipline; needs for continual preparation and program adjustment.

Agricultural, Food, and Environmental Education (AFEE)

Department of Work, Community, and Family Education

College of Education and Human Development

AFEE 1001. Introduction to Agricultural Education and Extension. (1 cr)
Historical development of the discipline of agricultural education; orientation to career opportunities; areas and expectations of specialization; issues in the field.

AFEE 1002. Principles of Career Planning for Agricultural Professionals. (1 cr)
Self-assessment and analysis of interests, skills, and abilities. Analyses of occupations, employment potential, employee expectations for work. Use informational interviews to examine career options and employment portfolio for career planning.
AFEE 5220. Special Topics in Agriculture Education and Extension. (1–3 cr; max 12 cr) Content varies by offering.

AFEE 5231. Agricultural Education Curriculum K-12. (2 cr; A-F only) Philosophy, organization, and administration of instruction in agricultural education programs at the elementary, middle, and high school levels.

AFEE 5233. Advanced Procedures in Teaching Agricultural Education. (2 cr; A-F only) New developments in methodology; assessment of innovations and procedures; consideration of various levels of instruction.

AFEE 5235. Advanced Supervised Agricultural Experience Programs. (2 cr) The organization and administration of agricultural experience programs for middle and secondary level students: career exploration, improvement projects, experiments, placement in production/business/community settings, entrepreneurship. Current state and national programs and resource material.


AFEE 5239. Program Organization and Management in Agricultural Education. (2 cr) Analysis of organization, management, and assessment of agricultural education programs at the middle, high school, and adult levels.

AFEE 5280. Current Issues for the Beginning Agricultural Education Teacher. (1–3 cr [max 3 cr]) Reflection, analysis on current problems and issues confronting beginning teachers of agricultural education. Issues in teaching methods, classroom and program management, discipline, curriculum, FFA and SAE development, school-to-work relationships.


AFEE 5296. Professional Experience Practicum in Agricultural Education and Extension. (1–4 cr) Observation, study, and experience in agricultural business and industry; identification of educational problems observed in the agricultural industry; evaluation of personal experience.

AFEE 5331. History, Philosophy, and Systems of Extension. (3 cr; A-F only) History and philosophy of extension; modifications and adaptation to worldwide methods and approved practices; extension methodologies: innovative approaches; systems appropriate to development environments.

AFEE 5341. Global Program Delivery Techniques and Technology of Extension. (2 cr; A-F only) Educational activities, teaching, and communications methods and techniques, from outreach to extension services, with an emphasis on youth and adult education programs in different global settings.

AFEE 5351. Methods for Change in Developing Countries. (3 cr; A-F only) Strategies and methodologies promoting change in developing countries. Examination of sociological and cultural parameters of improved practices in rural, community, and agricultural development. Project planning, implementation, and evaluation related to change in developing countries.

AFEE 5361. World Development Problems. (3 cr; A-F only) Introduction to development problems throughout the world. Development in Third World countries. Examples of First World development problems. Interdisciplinary focus on population, health and disease, education, agriculture, industry, finance, politics, and human rights.

AFEE 5371. Farming Systems Research and Extension. (3 cr; A-F only) Introduction to the theory and practice of linking farming systems, research, and extension. An interdisciplinary and holistic approach to rural development for individuals and communities throughout the world.

AFEE 5993. Directed Study in Agricultural Education and Extension. (1–4 cr; A-F only) Topics may be chosen to permit study of areas within education or to supplement areas of inquiry not provided in the regular course structure.

AFEE 5995. Integrating Paper—Master of Education: Agricultural and Extension Education. (1–4 cr; A-F only) Students prepare paper dealing with issues in agricultural education applied to professional responsibilities.

Agricultural Engineering Technology (AgET)

Department of Biosystems and Agricultural Engineering

College of Agricultural, Food, and Environmental Sciences

AgET 3213. Engineering Principles and Applications. (3 cr; QP–Math 1031 or Math 1142 or equiv, 3 cr phys or chem; SP–Math 1031 or Math 1142 or equiv, 3 cr phys or chem) Introduces a variety of engineering principles and concepts to non-engineering students. Quantitatively apply mathematical and engineering principles to solve problems from a range of areas in animal production, crop production, horticulture, and soil and water management.

AgET 5095. Special Problems in Biosystems and Agricultural Engineering. (1–5 cr; QP–#; SP–#) Individual study project in biosystems and agricultural engineering at advanced level. Application of engineering principles to a specific problem.

AgET 5203. Environmental Impacts of Food Production. (3 cr) Topics include crop production intensity, animal raising options, food processing waste alternatives, and pest control.

AgET 5212. Safety and Health Issues in Agricultural Work Environments. (2 cr; QP–Jr or sr or grad in Agri or Agri, #; SP–Agri or Agri or Agri or Agri or Agri) Examine emerging agricultural occupational safety and health issues including injury, work-related disease, pesticide exposure, pollution, biotechnology, and social implications of changing demographics and technologies.

AgET 5999. Special Workshop in Biosystems and Agricultural Engineering. (1–4 cr; QP–#; SP–#) Workshops on a variety of biosystems and agricultural engineering topics offered at locations other than the Twin Cities campus. See Class Schedule or department for current offerings.

Agricultural Industries and Marketing (AIM)

College of Agricultural, Food, and Environmental Sciences

AIM 4011. Student Project/Field Investigation. (3 cr) Application of marketing knowledge that involves building a complete marketing plan for an agricultural product or device. Team projects are used.

Agriculture (Agri)

College of Agricultural, Food, and Environmental Sciences

Agri 1000. Honors Colloquium. (2 cr [max 8 cr]; QP–Admission to COAFES honors program or #; SP–Admission to COAFES honors program or # A-F only) Colloquia introduce a topic related to contemporary agricultural currents and are designed for all COAFES majors. Topics change each semester, contact college office for topics.

Agri 1001. Freshman Seminar for Agricultural, Food, and Environmental Sciences. (1–2 cr) Topics related to agricultural, food, and environmental sciences.

Agri 1901. Topics: Freshman Seminar. (1–3 cr; QP–Fr with no more than 48 cr; SP–Fr with no more than 36 cr; A-F only) Interdisciplinary seminar. Topics specified in Class Schedule.

Agri 1910. Topics: Freshman Seminar. (1–3 cr; QP–Fr with no more than 48 cr; SP–Fr with no more than 36 cr; A-F only) Interdisciplinary seminar. Topics specified in Class Schedule.

Agri 1910W. Topics: Freshman Seminar. (1–3 cr; QP–Fr with no more than 48 cr; SP–Fr with no more than 36 cr; A-F only) Interdisciplinary seminar. Topics specified in Class Schedule.

Agri 3000. Seminar in International Agriculture. (1–4 cr [max 8 cr]; QP–#; SP–# A-F only) Oral presentations, discussion of students’ research papers. Literature review of selected topics. Discussions with students/staff about their experiences in international agriculture.

Agri 3101. Honors Experience. (2 cr [max 2 cr]; QP–Approved by COAFES honors program committee; SP–Approved by COAFES honors program committee; A-F only) Developed by student and COAFES faculty mentor. May include foreign study-travel, research, position or policy paper, or any experience demonstrating advanced study/service/understanding.

Agri 3500. Global Seminar. (3 cr [max 9 cr]; QP–#; SP–# A-F only) Interface of agriculture with various natural resource, environmental, economic, food safety, public policy, ethical issues transcending national borders. Seminars take place in other countries or regions of world, providing global perspective. Active learning, lectures, discussion tutorials, field trips, reports, exams.
Course Descriptions

Agronomy and Plant Genetics (Agro)

Department of Agronomy and Plant Genetics
College of Agricultural, Food, and Environmental Sciences

Agro 1093. Directed Studies. (1-4 cr [max 12 cr]; QP–5 cr in agronomy, #; SP–5 cr in agronomy, #) Allows study of agronomy in greater depth or in areas not currently offered in formal courses. Tutorial instruction under staff guidance.

Agro 1101. Biology of Plant Food Systems. (4 cr) Fundamental concepts of biology at the molecular, cellular, organismal, and ecosystem levels. Plants and plants use by humans, lab, greenhouse, field, and classroom discussions.


Agro 2103. Grain Grading and Crop Utilization. (1 cr [max 1 cr]; SP–AgEc 3411 recommended) Practice and principles of grain grading. Determining grading factors using Federal Grain Inspection Standards (FGIS) and understanding their importance in marketing grain products. Lab only.

Agro 2105. Seed Technology. (1 cr; SP–1103) Principles and practices of crop and weed seed identification, seed analysis, seed laws, seed handling, conditioning and viability testing. Appropriate for students interested in careers in the seed production or regulation industries.

Agro 2501. Weed Biology and Systematics. (2 cr; QP–Bio 1009 or equiv; SP–Bio 1009 or equiv) Identification of plant families and individual species of agricultural importance; major emphasis on characteristics of weed species, life cycles, and ecology.

Agro 3003. Introduction to Integrated Weed Management. (1 cr [max 1 cr]; QP–[Bio 1009 or equiv], Ent 3001, Pipa 3002; SP–Bio 1009 or equiv) Introduction to principles of biological, physical, and agricultural sciences that underlie practice of integrated weed management.

Agro 3005. Applied Crop Physiology and Development. (2 cr [max 2 cr]; QP–Chem 1001 or Chem 1051 or equiv, 8 cr of bio; SP–Biol 3002; [Chem 1001 or Chem 1120 or Ent 1023 or 9 cr in [bio or plant science]]) Applications of plant physiology to growth, development, and management of field crops. Effects of environment, management practices, plant morphology, and anatomy on physiological processes. Emphasizes inquiry, group activities.

Agro 3203W. Environment, Global Food Production, and the Citizen. (3 cr; QP–§AnPl 3010; Bio 1009 or equiv; SP–§AnSc 3203; Bio 1009 or equiv) Ecological and ethical concerns of food production systems in global agriculture—past, present, future. Examines underlying ethical positions about how agroecosystems should be configured. Decision cases, discussions, videos, other media.

Agro 4093. Directed Studies for Advanced Students. (1-4 cr [max 12 cr]; QP–20 cr in agronomy, #; SP–15 cr in agronomy, #) Allows study of agronomy in greater depth or in areas not currently offered in formal courses. Tutorial instruction under staff guidance.

Agro 4096. Professional Experience Program: Internship. (1-3 cr [max 6 cr]; QP–COAFES undergrad, #; complete internship contract available in COAFES Career Services before registering; UC only; SP–COAFES undergrad, #; complete internship contract available in COAFES Career Services before registering; UC only; SP–5 N only) Supervised professional experience in agribusiness firms or government agencies; evaluative reports and consultation with faculty advisers and employers.

Agro 4101. Experiment Design/Plot Techniques. (3 cr; QP–Jr or sr; SP–Jr or sr) Principles of field plot techniques and design applied to field demonstrations and experiments. Inductive/deductive reasoning, analysis of data, tests of significance, treatment comparisons.

Agro 4103. World Food Problems. (3 cr; QP–§AgEc 5790, §CAPS 5280, §FScn 5643, Jr or or grad; SP–AgEc 4103, §CAPS 4103, §FScn 4103; Jr or or grad) Multidisciplinary look at problems of and possible solutions for food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views on population, use of technology, and ecological and cultural values held in various parts of the world.

Agro 4201. Agro-ecosystems and Crop Production. (3 cr; QP–15 cr of bio and/or plant science; SP–10 cr of bio and/or plant science) Basic concepts in agroecosystems: organization, development, and function of field crop communities in contrast to natural ecosystems. Means of improving designed and managed systems for the benefit of human kind while minimizing impact on the ecosystem.

Agro 4305. Crop Harvest, Storage, Processing, Utilization. (3 cr; QP–Bio 1009, Chem 1001 or Chem 1051 or equiv; §Bio 1103, Bio 1009; AgET 3213, Pipa 3001, Ent 2001 recommended) Crop quality traits associated with use and influence on crop harvest, product quality, storage, handling, processing, and utilization. Principles and technology used in crop storage to minimize damage from fungi and insects, and maximize crop quality. Lecture and lab.

Agro 4401. Plant Genetics and Breeding. (4 cr; QP–§Bio 1009 or equiv, grad student, SP–Hort 4401; Bio 1009 or equiv, grad student with program committee approval, #) Principles of plant genetics and environmental variation. Applications of genetics to crop evolution and breeding of self-pollinated, cross-pollinated, and asexually propagated crops. Lab experiments in hybridization, variation, and selection.

Agro 4505. Integrated Weed Management. (4 cr; QP–3020, Soil 3125, Pbio 3111 or SP–3005, Pbio 3002, Soil 2125) Principles of weed management and use of coordinated control tactics including chemical, biological, and cultural means. Appropriate strategies attempt to optimize control methods in terms of economic, environmental, and social impact.

Agro 4603. Field Crop Scouting and Problem Diagnosis. (2 cr; QP–Intro courses in Agro, Ent, Pipa, Soil[,] Jr or sr; SP–3005, Ent 3001, Pipa 2002, Soil 3416, [Jr or sr with 16-20 cr in major]) Field based, hands-on problem solving. Diagnostic strategies. Updates about crops/crop problems in Minnesota. Part of intensive summer workshop at selected Minnesota Agricultural Experiment Stations. Extra course fee.

Agro 4605. Management Technologies for Crop Production. (3 cr; QP–Jr or sr or grad with program committee approval; SP–Jr or sr or grad with program committee approval) Lectures, discussions, and problem situations address solutions to crop management needs in various climatic zones and soil types in Minnesota. Focus on corn/soybean, small grain, and forage cropping systems. Emphasis on long-term productivity, profitability, and sustainability.

Agro 4660. Senior Capstone. (2 cr; QP–§Bio 5000 or ScAg 5009 or SP–4096 or ScAg 4009 or #) Problems and decision-centered cases focus on experience from ethical, technical, societal, and personal perspectives. Linked to undergraduate internship and to other experiential learning opportunities.

Agro 4888. Issues in Sustainable Agriculture. (2 cr; QP–[1010, Soil 1020] or 3125 or equiv; SP–[1103, Soil 1125] or 2125 or equiv) Agrocology, economic practices, production economics, environmental quality, holistic resource management, healthy food/water, rural communities.

Meet sustainable-agriculture advocates, including farmers, faculty, and representatives of non-profit sustainable-agriculture organizations.

Agro 5021. Introduction to Plant Breeding. (3 cr; QP–§GCB 3022 or equiv, background in plant science; SP–GCB 3022 or equiv, background in plant science) For majors not specializing in plant breeding. How genetics is applied to plant improvement. Emphasizes sustainable-production scenarios.

Agro 5310. Research Methods in Crop Improvement and Production. (1 cr; QP–Agro or Hort or PlBr grad; SP–Applied Plant Sciences grad; S-N only) Demonstrations and discussions of techniques in crop improvement and/or production research.

Presentations integrate biology with traditional breeding methods; production sessions emphasize ecologically sound cropping systems.

Agro 5321. Ecology of Agricultural Systems. (3 cr; QP–§Ent 5321; [3xxx or above] course in [Agro or AnSc or Ent or Hort or PlPa or Soil] or SP–§Ent 5321; [3xxx or above] course in [Agro or AnSc or Ent or Hort or PlPa or Soil] or SP–A-F only) Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

Agro 5999. Special Topics/Workshop in Agronomy. (1-4 cr; QP–Jr or sr; SP–Jr or sr) Workshops on a variety of topics in Agro offered at locations other than the Twin Cities campus. Presentations integrate in-depth lectures/experts. Topics specified in Class Schedule.

Akkadian (Akka)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Akka 5011. Elementary Akkadian I. (3 cr; SP–Adv undergrads with # or grad) Introduction to cuneiform script. Basics of Old Babylonian morphology and syntax. Written drills, readings from Hammurabi laws, foundation inscriptions, annals, religious and epic literature.

Akka 5012. Elementary Akkadian II. (3 cr; SP–5011) Continuation of 5011. Readings include The Gilgamesh Epic, The Descent of Ishtar, Mari Letters, Annals of Sennacherib and Asshurhaddil, Sargon II.

Akka 5300. Readings in Akkadian. (3 cr [max 18 cr]; SP–5011, 5022) Survey of Akkadian literature, including literary, legal, historiographical, and sacred texts. Topics specified in Class Schedule.

American Indian Studies (Amln)

Department of American Indian Studies

College of Liberal Arts

Amln 1001. Indigenous Peoples: an American Perspective. (3 cr) Introduction to how voices/visions of indigenous peoples have contributed to history of cultural expression in North America. Historic contexts/variety of this expression by region, tribal cultures. Emphasizes contributions in literature, philosophy, politics, fine arts.


Amln 1101. Beginning Ojibwe I. (4 cr) Acquaintion of speaking skills, fundamentals of grammar, and writing skills.

Amln 1102. Beginning Ojibwe II. (4 cr; SP–1101) Acquaintion of speaking skills, fundamentals of grammar, and writing systems.
Amin 1121. Beginning Dakota I, (4 cr) Development of the four skills of language acquisition: listening, speaking, reading, and writing. Oral drills and in-class participation focused on questions and answers.

Amin 1122. Beginning Dakota II, (4 cr; SP–1121) Further development of language acquisition skills with oral drills and in-class participation focused on questions and answers.

Amin 3103. Intermediate Ojibwe I, (4 cr; SP–1101, 1102) Improving speaking skills; grammatical structures; storytelling, oral history, and translation projects.

Amin 3104. Intermediate Ojibwe II, (4 cr; SP–1101, 1102, 3103) Improving speaking skills; grammatical structure; storytelling, oral history, and translation projects.

Amin 3123. Intermediate Dakota I, (4 cr; SP–1122) Development of listening, speaking, reading, and writing skills with oral drills and in-class participation focused on questions and answers.

Amin 3124. Intermediate Dakota II, (4 cr; SP–1121, 1122, 3123) Further development of the listening, speaking, reading, and writing skills with oral drills and in-class participation focused on questions and answers.

Amin 3201W. American Indian Literature, (3 cr) Comparative studies of oral traditions, modern literature, and visual arts depicting rituals, traditions, values, and worldviews of indigenous peoples. Topics include native medicines and healing practices, ceremonies and ritual, governance, ecology, humor, tribal histories, and status of contemporary native peoples.

Amin 3300. American Indians and Photography, (3 cr) Historical/comparative overview of photos in which American Indian people are central subjects. Primary features of images in American Indian photos. Relationships among those involved in making/ viewing photos. Ways in which photos are interpreted. Relation of photos to social contexts in which they are produced and to agencies of those who stand behind their making.

Amin 3401. American Indian Art, (4 cr) Visual arts depicting rituals, traditions, values, and worldviews of major American Indian populations. Creative processes of art from pre-contact times through contemporary art. Emphasis placed on style, technique, materials and imagery, and symbolism.


Amin 3701. Ojibwe Culture and History, (3 cr) Ojibwe culture, history, and traditions including philosophy, religion, and lifestyle. Students develop an appreciation for the values and belief systems of traditional Indian people.

Amin 3711. Dakota Culture and History, (3 cr) An overview of Dakota culture, language, history, literature, contemporary issues, and the arts.

Amin 3870. Topics in American Indian History, (3 cr) Topics may include social history, oral history, history of particular regions, political systems, education, and policy. Designed for undergraduates.

Amin 3871. American Indian History: Precontact to 1830, (4 cr) American Indian history from the era of ancient Native America to the removal era. Social, cultural, political, and economic diversity of Native American peoples and Native American experiences with European colonialism.

Amin 3872. American Indian History: 1830 to the Present, (4 cr) American Indian history from 1830 to the present. Impact of federal Indian policy on American Indian cultures and societies.

Amin 3876. American Indian Education, (3 cr) Educational processes in American Indian cultures; history of school programs established for tribes by missionaries and the U.S. and Canadian governments; the importance of boarding schools in shaping the lives, families, communities, and educational expectations of Indian people in the late-19th and early-20th centuries.

Amin 4201. Topics in American Indian Literature, (3 cr) Topics organized around issues of theme or genre or region or tribe or gender.

Amin 4231. The Color of Public Policy: African Americans, American Indians, and Chicanos in the United States, (3 cr) Structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporary communities of color in the United States.


Amin 4511. American Indian Political Economy, (3 cr; QP–1771; SP–1001) Sources, nature, consequences of social/economic development/change in Indian communities. Precontact Indian communities. Effect of European contact. Social movements into 20th century, including phenomenon of urban Indian communities.

Amin 4515. Contemporary American Indian Movements, (3 cr; SP–1001) American Indian organizations and social movements of the 20th century. Explorations of political activism on and off reservations; treaty disputes; economic development strategies; the revival of traditional beliefs.

Amin 4525. Federal Indian Policy, (3 cr) Formulation, implementation, evolution, comparison of Indian policy from pre-colonial times to self-governance new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature related to policies.

Amin 4721. American Indian Communities of the Great Lakes, (3 cr) American Indian communities of the Great Lakes over time, with particular attention to Ojibwe, Dakota, and HoChunk experiences. How the richness of the world created by Great Lakes tribes was damaged, depressed, and altered but not destroyed by the arrival of EuroAmericans.

Amin 4990. Topics in American Indian Studies: The Black Hills in American Indian History, (3-4 cr [max 3 cr]) Each student chooses tribe (e.g., Lakota, Cheyenne, Arapaho, Arikara, Kiowa, Apache, Shoshone, Hidatsa, Crow) with known historical association to Black Hills and builds a dome U.S. record of that association based on ethnographic/historic sources. Students assemble bibliography, documentary record of association and write a paper summarizing their findings.

Amin 4991. Independent Study, (1-12 cr [max 18 cr]; QP–, SP–, ∆, ∆, ∆) Opportunities for experiential learning in a variety of American Indian community settings. Consult department faculty at least one term before enrolling.

Amin 5890. Problems in American Indian History, (3 cr; SP–) Intensive consideration of topics in American Indian history. Possible topics include social history, Indian history of particular regions, political systems, education, and American Indian policy.

Amin 5920. Topics in American Indian Studies, (2-4 cr [max 4 cr]; AF only) Intensive examination of a particular topic (e.g., American Indian education, American Indians of the Great Lakes, American Indians of the Southwest, American Indians and the Federal government).

American Sign Language (ASL)

Department of Educational Psychology
College of Education and Human Development

ASL 1701. American Sign Language I, (4 cr) Introduction to learning and understanding American Sign Language (ASL); cultural values and rules of behavior of the deaf community in the United States. Includes receptive and expressive readiness activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling; and deaf culture.

ASL 1702. American Sign Language II, (4 cr; QP–EPsy 1601 or SP–1701 or #) Increased communication skill in American Sign Language (ASL); cultural values and behavioral rules of the deaf community in the United States; receptive and expressive activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling and aspects of deaf culture.

ASL 3703. American Sign Language III, (4 cr; QP–EPsy 1603 or #; SP–1702 or #) Expanded instruction of American Sign Language (ASL). Receptive and expressive activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling; narrative skills; cultural behaviors; and aspects of deaf culture. Abstract and conversational approach.

ASL 3704. American Sign Language IV, (4 cr; QP–EPsy 3601 or #; SP–3703 or #) Increases the emphasis on more abstract and challenging conversational and narrative range. Includes receptive and expressive readiness activities; sign vocabulary; grammatical structure; receptive and expressive fingerspelling; various aspects of deaf culture and cultural behavior rules.

ASL 3705. Cultural Perspectives of Deafness, (2 cr) Introduction to the deaf community as a linguistic and cultural minority group. Role of deaf people in the larger society; political activism; laws; access to information; educational philosophies and methods; and communication systems.

ASL 5642. Classroom Communication Through ASL, (1-2 cr [max 3 cr]; QP–Fluency in ASL or #; SP–Fluency in ASL #; 5-9 only) American Sign Language (ASL) form/function, vocabulary production, grammatical features needed by professionals working with children, storytelling strategies, technical sign language for classroom teachers. Content progresses in repeated segments.
American Studies (AmSt)

Department of American Studies
College of Liberal Arts

AmSt 1001V. Honors: Literature, Power, and the American Peoples to 1900. (4 cr; SP–§1001W, Honors) Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1001W. Literature, Power, and the American Peoples to 1900. (4 cr) Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1002W. Music, Movies, and the American Peoples in the 20th Century. (4 cr) Interdisciplinary study of American society from industrialization through the present. Examination of American literature, art, music, and popular culture in historical context.


AmSt 1113. American Cultures III, Transition. (3 cr; A-F only) Interdisciplinary study of diversity of American cultures, 1945-present. Family practices/gender roles, social change movements (civil rights, American Indian, women’s), Politics of popular culture (music, television, fashion, art).

AmSt 1201. Learning Public Ethics Through Arts and the University. (3 cr; A-F only) Residential College course on study of public ethical decision-making. Case studies of University institutions, literature, and arts, looking at University/public interaction and arts representations to learn ways ethics works in people’s participation in public life.

AmSt 1908W. Freshman Seminar. (3 cr; SP–Fr or no more than 36 cr; A-F only) Topics specified in Class Schedule.

AmSt 3111. American Cultures and the Arts. (3 cr) Relationships between American cultures and artistic production through study of the works and lives of selected artists. How American societies and cultures shape, and are shaped by, artistic forms and expressions.

AmSt 3113W. America’s Diverse Cultures. (3 cr; A-F only) The study of some of the diverse cultural (racial, ethnic, class) groups in America; institutions and processes that shape their relations and create domination, resistance, hybridity, nationalism, racism, and alliance. Specific content may vary.

AmSt 3114. America in International Perspective. (3 cr; F only) The nature of international cultural exchange. The impact of U.S. cultures and society on other countries of the world as well as the impact of other cultures and societies on the United States.

AmSt 3252W. American Popular Culture and Politics: 1900 to 1945. (3 cr; A-F only) Historical analysis of how popular arts represent issues of gender, race, consumerism, and citizenship. How popular artists define the boundaries of citizenship and public life: exclusions and exclusions in polity and national identity. How popular arts reinforce or alter political ideologies.

AmSt 3253W. American Popular Culture and Politics: 1945 to the Present. (3 cr; A-F only) Historical analysis of how popular arts represent issues of gender, race, consumerism, and citizenship. How popular artists define the boundaries of citizenship and public life: exclusions and exclusions in polity and national identity. How popular arts reinforce or alter political ideologies.

AmSt 3299W. Junior Proseminar. (3 cr; A-F only) Exploration of classic and contemporary works and problems in medieval and renaissance field; the development of American Studies and the idealizing of an American past; the challenges of multiculturalism and contemporary themes in the field.

AmSt 3301W. Senior Proseminar in American Studies. (3 cr; SP–AmSt sr) Each semester covers a problem related to a representative theme, figure, or period. Students research and write senior theses.

AmSt 3302W. Senior Proseminar in American Studies. (3 cr; SP–AmSt sr) Each semester covers a problem related to a representative theme, figure, or period. Students research and write senior theses.

AmSt 3920. Topics in American Studies. (3 cr; SP–Jr or sr) Topics specified in Class Schedule.

AmSt 3993. Directed Studies. (1-9 cr; max 9 cr; SP–#) Guided individual reading or study.

AmSt 4101W. Gender, Sexuality, and Politics in America. (3 cr; A-F only) Ways public and private life intersect through the issues of gender, sexuality, family, politics, and public life; ways in which racial, ethnic, and class divisions have been manifest in political ideologies affecting private life.

AmSt 5101. Religion and American Culture. (3 cr; A-F only) Role of religion in shaping contemporary American cultural pluralism. Institutions and processes, intellectual frameworks, aesthetic and symbol systems that form religious communities and contribute to religious conflicts in U.S. society and culture.

AmSt 5502. Thought and Practice of American Religions. (4 cr; SP–#) Holidays, festivals, religious arts, organizations, spirituality, ethics, and systems of thought of “civil religion,” “women’s religion,” indigenous American religions, American versions of Christianity, Judaism, Islam, Buddhism, and other world faiths, and their interactions in the United States and worldwide.

AmSt 5920. Topics in American Studies. (3 cr; max 9 cr; SP–#) Topics specified in Class Schedule.

Ancient Near Eastern (ANE)

Department of Classical and Near Eastern Studies
College of Liberal Arts


ANE 3251. Modern Study of the Old Testament. (3 cr; SP–Knowledge of Hebrew not required) Methods used in studying the Old Testament, including textual criticism, the anthropological approach, the sociological approach, the history of religion, and the use of archeology in interpreting the text.


ANE 3502. Ancient Israel: From Conquest to Exile. (3 cr; SP–Hebrew not required; 3501 recommended) Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to Israelite conquest of Canaan.

ANE 3503. History and Development of Israelite Religion I. (3 cr; SP–No knowledge of Hebrew required) Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

ANE 3504. History and Development of Israelite Religion II. (3 cr) Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.

ANE 3951. Major Project. (4 cr; SP–ANE major, 3 exxx ANE courses or #) Research project pertaining to the study of the ancient world, using documents or other primary sources along with secondary sources. Students select project in consultation with a faculty member.

ANE 5501. Ancient Israel: The Origins of Israel in Biblical Traditions. (3 cr; SP–Knowledge of Hebrew not required) The foundation of the Hebrew people; traditions of the patriarchal period, development of Israelite religious and legal institutions; Ancient Near Eastern context of Israel’s origins.

ANE 5502. Ancient Israel: From Conquest to Exile. (3 cr; SP–A 3502, RELA 3502, RELA 5502; Hebrew not required; 5501 recommended) Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focus on issues raised by archaeological data related to Israelite conquest of Canaan.

Animal Science (AnSc)

Department of Animal Science
College of Agricultural, Food, and Environmental Sciences

AnSc 1011. Domestic Animals and Society. (3 cr)
Controversial issues in animal agriculture including animal products in the human diet; livestock and human competition for limited resources; animal behavior, welfare, and rights; organic vs. conventionally-produced food; livestock integration into sustainable resource utilization.

AnSc 201B. Avian Sampler. (1 cr)
Topics vary; see Class Schedule or contact the department.

AnSc 1101. Introductory Animal Science. (4 cr)
Fundamental concepts of animal breeding, physiology, nutrition, and management as they apply to the production of beef, dairy, horses, poultry, sheep, swine, and other livestock.

AnSc 1403. Companion Animal Nutrition and Care. (2 cr)
For those without animal or nutrition training who have an interest in animal care. Nutrition of healthy animals and factors including behavior, environmental conditions, food type and availability. Focus on companion animals.

AnSc 1511. Food Animal Products for Consumers. (3 cr)
Introduction to the compositional variation, processing, selection, storage, cookery, palatability, nutritional value, and safety of red meat, poultry, fish, and dairy products.

AnSc 3011. Dairy Cattle Judging. (2 cr; QP–#; SP–#)
Evaluation of dairy animals on the basis of physical appearance, including classes of heifers and cows from the six major dairy breeds. Held in conjunction with the Minnesota State Fair. Training in oral reasons.

AnSc 3012. Livestock and Carcass Evaluation. (3 cr)
Evaluation of cattle, swine, and sheep. Breeding stock evaluated on live appraisal, performance records, and breeding values. Market animals evaluated, graded, and priced on physical appearance followed by evaluation and grading of their carcasses.

AnSc 3013. Beginning Livestock Judging. (2 cr; QP–1120 recommended, soph or jr or sr or #; SP–Soph or jr or sr; #2012 recommended or #)
Visual evaluation of beef cattle, swine, and sheep for type, muscling, degree of finish, structure, and soundness. Short oral presentations. Preparation for collegiate livestock judging competition.

AnSc 3012. Horse Production. (2 cr)

AnSc 2211. Biometrics for Livestock. (3 cr; QP–#5 Sat 3011, #5530, #2012, Math 1031 or higher, SP–#5 Sat 3011, #5530 or jr or #)

AnSc 2301. Systemic Physiology. (4 cr; QP–Bio 1009 or equiv; SP–Bio 1009 or equiv)
Introduction to the neurology of the central, respiratory, immune, and digestive systems of domestic animals.

AnSc 2401. Animal Nutrition. (3 cr; QP–Chem 1002 or Chem 3301; SP–Bioc 1012 or Chem 2301)
Classification and function of nutrients; use of nutrients for body maintenance, growth, egg production, gestation, and lactation; comparative study of the digestive systems of farm animal species.

AnSc 3012. Equine Management. (3 cr; SP–2102)
Fundamentals of horse management. Record keeping (traditional, computer based). Legal aspects (e.g., contracts, zoning, liability, insurance). A management project involves establishing, maintaining, improving an equine business.

AnSc 3141. Advanced Dairy Judging. (1 cr; QP–1110 or # or SP–2011 or #)
Training in presentation of oral reasons in dairy cattle judging. Selected students from this course participate in fall intercollegiate dairy judging contest.

AnSc 3142. Advanced Livestock Judging. (2 cr; QP–3130 or # or SP–2013 or #)
Visual evaluation of beef cattle, swine, and sheep for muscling, finish, structure, and soundness. Use of production (growth and reproduction) records in evaluation. Preparation for national collegiate livestock judging contest.

AnSc 3143. Meat Judging and Grading. (2 cr; QP–1143, SP–1511,
In-depth training in beef, pork, and lamb judging, writing reasons, and beef carcass grading and specifications. Field trips to livestock productions. Students selected from course participants in intercollegiate meats judging contests.

AnSc 3203W. Environment, Global Food Production, and the Citizen. (3 cr; QP–Bio 1009 or equiv; SP–AnSc 3401, 3510)
Ecological and ethical concerns of food production systems in global agriculture—past, present, and future. Examining underlying ethical positions about how agroecosystems should be configured. Interactive learning utilizes decision cases, discussions, videos, and other media.

AnSc 3221. Animal Breeding. (4 cr; QP–GCB 3202 recommended)
Application of qualitative and quantitative genetics to animal breeding. Concepts of livestock improvement through selection and mating programs.

AnSc 3305. Reproduction, Artificial Insemination, and Lactation. (4 cr; QP–3301; SP–Bio 1009 or equiv)
Reproductive organ functions, fertilization, estrous cycle and endocrine control, reproductive efficiency, and problems and principles of artificial insemination. Anatomy, physiology, and biochemistry of mammary gland. Mammary growth, initiation, and maintenance of lactation, milk synthesis, and factors influencing lactation curve.

AnSc 3307. Artificial Insemination Techniques. (1 cr; QP–3305 recommended, #SP–3305 recommended, #)
Hands-on training and techniques of artificial insemination at an off-campus laboratory setting. Proper techniques of AI and semen handling, and criteria for selection of bulls.

AnSc 3511. Animal Growth and Development. (3 cr; QP–3301; SP–2301)
Basic principles of animal growth; critical evaluation of interactions of nutrition, hormones, exercise, heredity, and disease in regulating growth.

AnSc 4011. Dairy Cattle Breeding. (3 cr; QP–3220; SP–3221)
Applying quantitative genetic principles to the breeding of dairy cattle. Primary emphasis on the evaluation of traits, methods, and systems of mating. Rates of genetic improvement with and without AI.

AnSc 4092. Special Problems in Animal Science. (1-4 cr; QP–#; SP–#)
Research in an area of animal science under the supervision of a faculty member. Written report on the research is required.

AnSc 4093. Tutorial in Animal Science. (1-4 cr; QP–#; SP–#)
Informally structured to encourage in-depth study of specific disciplines in animal science. Pertinent readings; preparation of written essays of high quality required.

AnSc 4096. Professional Experience Program: Internship. (1-3 cr; max 6 cr; QP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; SP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only)
Supervised professional experience in animal industries and farm enterprise systems with study of various aspects of the industry and related fields; evaluative reports and consultations with faculty advisers and employers.

AnSc 4099. Special Workshop in Animal Science. (1-4 cr)
Workshops on a variety of topics in animal science. Consult Class Schedule or department for offerings. Topics may use guest lecturers/experts.

AnSc 4401. Swine Nutrition. (3 cr; QP–3401; 3510 recommended; SP–2401, 3511 recommended)
A comprehensive review of major considerations in providing optimum, cost-effective nutrition to swine in all stages of production.

AnSc 4403. Ruminant Nutrition. (3 cr; QP–3401; SP–2401)
Nutrient requirements of ruminants, physiology of digestion in ruminants, nutrient content of feedstuffs, primarily forages; energy utilization, protein and nonprotein nitrogen utilization; nutritional disorders; formulation of adequate rations.

AnSc 4405. Poultry Nutrition. (3 cr; QP–3401; SP–2401)
Nutrient requirements of chickens and turkeys; feed composition and use in formulation of adequate diets. Role of feed additives. Least cost formulations. Nutritional interrelationships, and feeding systems.

AnSc 4501. Principles of Farm Animal Environment. (3 cr; QP–3301; jr or sr or SP–2301, jr or #)
Biological and physical processes involved in the adjustment of animals to ambient environments and their applications to farm animal management.

AnSc 4601. Pork Production Systems Management. (4 cr; QP–3220, 3305, 4501, 5609 recommended; SP–3221, 3305, 4401, 4501 recommended)
Focus on the understanding of inter-relationships of business, marketing, and biological performance of pigs in various types of production systems.

AnSc 4602. Sheep Production Systems Management. (4 cr; QP–3401; 3220 recommended; SP–2401; 3221 recommended)
Sheep management using feeding, breeding, selection, health, and physiological management aids for breeding flock and market lamb production. Taught via ITV with Crookston campus and the West Central Experiment Station, Morris.

AnSc 4603. Beef Production Systems Management. (4 cr; QP–4503 recommended; SP–4403 recommended)
Status and characteristics of the beef industry; apply principles of animal breeding, nutrition, physiology, and economics to management of beef cattle breeding herds and cattle feeding operations. Ration formulation, management of feed marketing of feedlot cattle.

AnSc 4604. Dairy Production Systems Management. (4 cr; QP–3401; 3305, 3220, 5403 recommended; SP–2401, 3221, 3305, 4403 recommended)
Practical applications of principles of animal breeding, nutrition, physiology, reproduction, housing, and economics in a problem solving context. Active learning with decision-case discussion, farm visits, and field diagnostic techniques laboratories.

Class Schedule

Course Descriptions

ANE 5504. History and Development of Israelite Religion II. (3 cr)
Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.

ANE 5701. Studies in Semitic Linguistics and Inscriptions. (3 cr; SP–Adv Hebrew or Adv Arabic or #)
Survey of comparative Semitic linguistics with emphasis on Northwest Semitic. Reading of Phoenician, Moabitic, and Judean inscriptions.

ANE 5713. Introduction to Ugaritic. (3 cr; SP–Adv Hebrew, previous study of biblical texts or #)
Ugaritic alphabetic cuneiform script, morphology, and syntax. Reading of representative samples of Ugaritic literature. Attention to linguistic and cultural issues and links to biblical and other Ancient Near Eastern texts.

ANE 5993. Directed Studies. (1-4 cr; SP–#; #)
Guided individual reading or study.
Anthropology (Anth)

College of Liberal Arts

Anth 1001L. Human Evolution. (4 cr)
From ancestors of chimpanzees and humans to origins of modern humans. Principles of evolutionary theory, behavioral biology, and comparative anatomy used to reconstruct the major events in human evolution and the behavior of ourselves and our ancestors.

Anth 1001H. Honors: Human Evolution. (4 cr; QP–Honors; SP–§ 1001; honors)
From ancestors of chimpanzees/humans to origins of modern humans. Principles of evolutionary theory, behavioral biology, comparative anatomy used to reconstruct the major events in human evolution, behavior of ourselves and our ancestors.

Anth 1005V. Honors: Cultural Anthropology: Understanding Ourselves and Others. (4 cr; A-F only)
Introduction to the anthropology of cultural diversity in the United States, around the world. Comparative study of relationship between local cultures, global processes. Race/ethnicity, economic/social organization, political/religious systems, gender, social change.

Anth 1005W. Cultural Anthropology: Understanding Ourselves and Others. (4 cr)
Introduction to anthropology of cultural diversity, in the United States and around the world. Comparative study of relationship between local cultures and global processes. Race/ethnicity, economic/social organization, political/religious systems, gender, social change.

Anth 1111. Human Origins. (3 cr; A-F only)
World prehistory as investigated by anthropologists. Methods/concepts used to study prehistoric human biological/cultural development.

Anth 1902. Freshman Seminar. (3 cr; A-F only)
Topics specified in Class Schedule.

Anth 1904. Freshman Seminar. (3 cr; A-F only)
Topics specified in Class Schedule.

Anth 1909W. Freshman Seminar. (4 cr; max 6 cr; SP–Fr or no more than 3 cr; A-F only)
Topics specified in Class Schedule.

Anth 3001. Introductory Archaeology. (4 cr)
The fundamentals of fieldwork, laboratory analysis, and interpretation in archaeology. How field and laboratory research are designed and implemented, and how results are interpreted.

Anth 3003. Cultural Anthropology. (3 cr; SP–1003 or #)
Areas of study may include field research and the politics of ethnographic knowledge: Marxist and feminist theories of culture; culture, language and discourse; psychological anthropology; culture and transnational processes.

Anth 3005. Language and Sociocultural Analysis. (4 cr; SP–1003 or #)
Studying sociocultural forms by analyzing linguistic data obtained in a fieldwork setting. Students work with a fluent speaker of a non-English language to explore an unfamiliar culture in the manner of an ethnographer working with a key informant.

Anth 3007. Laboratory Techniques in Archaeology. (3 cr; SP–1001, 3001)
Focuses on plant remains, material culture, faunal remains, and human osteology. Emphasis on lab experience.

Anth 3009. Rise of Civilization. (3 cr)
The concept of civilization, from early hunter gatherer groups through settled agricultural villages to the rise of towns and cities. Compares processes of change in eight regions of the world.

Anth 3010. Native North Americans in Regional Perspective. (3 cr; max 6 cr)
An in-depth cultural and historical survey of native peoples who inhabit a particular region of North America (e.g., the greater southwest, prairie/woodland transition zone, Great Lakes area, Northwest coast, etc.).

Anth 3011. Archaeology of the Ancient Near East. (3 cr; SP–3001)
Development of culture and society in ancient Near East from beginnings of agriculture and settled village life to first states and up to the threshold of imperialism (10,000 to 2,000 B.C.).

Anth 3013. American Indian Languages and Cultures. (3 cr)
Survey of cultural developments among North American peoples in prehistoric times to present; comparative perspectives on North American Indian cultures and their social, cultural, and economic environments; the role of the artist and the relationship between a Native American culture and its environment.

Anth 3017. Peoples and Cultures of Middle America. (3 cr)
Indian and Mestizo (Hispanic) cultures of Mexico and Guatemala and parts of Belize, Honduras, and Nicaragua. Describes both pre-Hispanic and Hispanic influences, with attention to area-wide patterns and local traditions.

Anth 3019. Hispanic Cultures of Latin America. (3 cr; SP–1003 or #)
Hispanic cultures from Mexico to South America. Topics such as economy, undertalement; the family and ritual kinship, gender, religion, values, ideology, and change. Concepts are introduced to explore contiunity and change.

Anth 3020. Topics in the Anthropology of Africa. (3-6 cr; max 6 cr)
Perspectives on Africa using ethnographic methods and theories. Topics such as kinship and gender; ecological adaptations; economic systems; belief systems; political organization; art and aesthetics; Islamization; colonization; liberation movements and nationalism; culture change.

Anth 3023. Culture and Society of India. (3 cr)
Contemporary society and culture in South Asia from an anthropological perspective with reference to nationalism; postcolonial identities; media and public culture; gender, kinship and politics; religion; ethnicity; and the Indian diaspora.

Anth 3025. Pacific Island Societies. (3 cr; SP–1003 or 3003 or #)
Geography, prehistory, and Western exploration of Pacific Islands from Hawaii to Papua New Guinea. Culture change as these peoples become incorporated into the modern world system. Topics in regional ethnology. Relationships of societies to major issues in anthropological thought.

Anth 3027W. Archaeology of Prehistoric Europe. (3 cr)
Early development of non-Mediterranean European society from Old Stone Age through Iron Age to the Roman Period, based on archaeological evidence. Principle transformations of European culture with introduction of agriculture, development of metallurgy, and emergence of towns and cities.

Anth 3028. Historical Archaeology of North America. (3 cr; A-F only)
Emphasizes research approaches. Documentary research, oral history, probate inventories/acculturation, integration of documents/archaeological data, analysis of community patterning, social analysis of architecture, foodways, artifact identification, mean ceramic dating, industrial archaeology, estimation of social status with cemetery data, sampling, report writing.

Anth 3029. Archaeology of Native Americans. (3 cr; SP–1001)
Pre-European contact and contact period archaeology of American Indians north of Mexico.

Anth 3031. Altering States: Culture and Politics in Eastern Europe. (3 cr)
Post-socialist transitions in Central and Eastern Europe from an anthropological perspective. Explores daily life under socialism and the collapse of socialist rule in relation to key areas of social life such as gender, identity, nationalism, and ethnicity.

Anth 3035. Anthropology of Death. (3 cr; QP–1102 or SP–1003 or #)
Anthropological perspectives on death. Diverse understandings of afterlife, cultural variations in death ritual, secularization of death in the modern era, management of death in medicine, cultural shifts in the way we think about death.

Anth 3041. Ecological Anthropology. (3 cr; SP–§5041; 1003)
Concepts, theories, and methods of ecological anthropology (cultural ecology) show how humans interact with the biophysical environment. Compare biological and cultural interactions with the environment; examine adaptive strategies cross-culturally.

Anth 3043. Art, Aesthetics and Anthropology. (3 cr)
The relationship of art to culture from multiple perspectives including ethnographic; comparative; social; and cultural contexts of art production; the role of the artist in different cultures; methodological considerations in the interpretation of art across cultural boundaries.

Anth 3045. Religion and Culture. (3 cr; SP–1003 or #)
Course examines religious beliefs and practices cross-culturally; religious dimensions of human life through theories of the origins, functions, and forms (e.g. myth, ritual, and symbolism) in religion in society.
Anth 3047W. Gender in Cross-Cultural Perspectives. (3 cr)
Relationship of biology and culture; cultural construction of gender and sexuality; variations in economic organization; women’s involvement in ritual and religion; impact of colonialism on gender; rise of the state and gender issues.

Anth 3221. Archaeological Field School. (3 cr; max 6 cr; SP–3001 or 3003 or grad)

Anth 3310. Topics in Biological and Physical Anthropology. (3-6 cr; max 6 cr; SP–1001)
Topics may include faunal analysis, the human skeleton and osteology, primate and human evolution, and forensic anthropology. Topics vary according to student and faculty interest.

Anth 3913. Senior Project Planning. (1 cr; SP–Jr or Sr major)
Evaluation of work to date; planning future course work and prospects for senior research project. Includes defining senior project, finding an advisor, and developing preliminary bibliography. Normally completed at least two semesters before graduation.

Anth 3980. Topics in Anthropology. (3 cr; max 6 cr)
Topics specified in Class Schedule.

Anth 4001. Advanced Method and Theory in Archaeology. (3 cr; SP–1001 or 3001)
Survey and in-depth study of past and contemporary archaeological, theoretical, and methodological issues and approaches. Projects incorporating theories and methods. Emphasis on problem solving and integrating method and theory.

Anth 4003W. Contemporary Perspectives in Cultural Anthropology. (3 cr; SP–1001, 3001 or #A-F only)
Concept of culture, practice of fieldwork as it relates to various social institutions. Anthropological perspectives on race, ethnicity, gender.

Anth 4011. Senior Seminar. (3 cr; SP–Sr, anth major; #A-F only)
Research seminar. Topics/methodologies differ according to staff, student interests. Students complete substantial research paper.

Anth 4013. Senior Project. (3 cr; SP–Sr major; #)
Independent research project fulfilling the senior option; directed by a faculty member.

Anth 4019. Symbolic Anthropology. (3 cr; SP–5821, 1003 or #)
Examines pragmatic and structural aspects of social symbolism cross-culturally with special attention to power, exchange, sex, social boundaries, gender, and rituals of transition and reversal.

Anth 4021. Psychological Anthropology. (3 cr; SP–5820; 1003, 3003 or #)
Self, emotion, cognition, and child development in cross-cultural perspective. Examines cultural and social influences on personality, and psychological foundations of society and culture.

Anth 4023W. Culture Theory. (3 cr; SP–Jr or Sr or grad or #A-F only)
In-depth examination of key developments in the culture concept from Darwin to present-day postmodern approaches. Examines the view that cultures have an inherent order that cannot be explained psychologically or biologically, and reactions to this view.

Anth 4025. Studies in Ethnographic Classics. (3 cr; SP–1003 or grad or #A-F only)
Five types of explanations employed in ethnographic research: differentiation and the theory of survivals; the functionalist response; the British structuralists; French structuralism; and the interpretive turn.

Anth 4031. Applied Anthropology. (3 cr; SP–1003 or 4003 or grad or #)
Introduces the practical application of theories and methods from social and cultural anthropology. Examines issues of policy, planning, implementation, and ethics as they relate to applied anthropology.

Anth 4035. Ethnographic Research Methods. (3 cr; SP–1003 or grad)
Introduces the history of and current issues in ethnographic research. Research projects, include participant observation, interviewing, research design, note taking, life history, and other ethnographic methods.

Anth 4043. Archaeology of Southern Europe. (3 cr; SP–1003 or grad)
Archaeology of the northern part of continental Europe, from late-Bronze Age through Viking Period. Themes include art and symbolism; growth of towns; societal interactions; religion and ritual; introduction of Christianity; and development of long-distance trade.

Anth 4045. Gender and Power in South Asia. (3 cr; SP–1003 or 3003 or #)
Analysis of the politics of gender in South Asia, especially India, focusing on colonial and nationalist constructions of gender and “tradition”; kinship, class and gender; gender and women’s speech; feminism in India; fundamentalism and postcolonial identities; gender and violence.

Anth 4047. Anthropology of American Culture. (3 cr; SP–1003 or 3003 or #)
Anthropological approaches to contemporary American society and culture; tensions between market and family; unity and diversity; individualism and community.

Anth 4051. Kinship, Gender and Diversity. (3 cr; SP–1003)
Cross-cultural variation in meanings, expectations, and practices related to marriage, family, sexuality and parenthood. Applies knowledge of variations to cultural diversity and other issues in U.S. society (e.g. changing marriage and family forms, incest, reproductive rights, reproductive technology).

Anth 4053. Economic Anthropology. (3 cr; SP–58205; 1003 or 3003 or 4003 or grad)
Systems of production and distribution, especially in nonindustrial societies. Comparison, history, and critique of major theories in the field; development of a cross-cultural, anthropological approach to material life that subsumes both market and nonmarket processes, and explores the relation to theory.

Anth 4057. Politics and Law. (3 cr; SP–1003 or grad)
Problems of political organization, order and authority in nonstate as well as state-based societies. Historical and cross-cultural survey of the concepts through which these problems have been understood. Comparative political and legal systems, featuring case studies from Africa, Peru, New Guinea, Indonesia, and the United States.

Anth 4061. Culture and Childhood. (3 cr; SP–1003 or 3003 or grad)
The contexts, expectations, and tasks/activities of childhood based on case studies from diverse cultures. Application and evaluation of Western theories of child development in relation to non-Western societies. Consideration of conditions of childhood from a global perspective.

Anth 4065. Cultural Change and Development. (3 cr; SP–1003 or 4003 or #)
Theories of change; modernization, dependency and processes of movements of social, political, economic organization; women’s involvement in ritual and religion; impact of colonialism on gender; rise of the state and gender issues.

Anth 4075. Cultural Histories of Medicine. (3 cr; SP–1003 or 3003 or #, A-F only)
Evaluation of main trends in the study of racism; psychological, sociological, symbolic, and “critical” approaches which treat racism as a sociodiscursive phenomenon. Examines racist discourse as a practice which defines an “other” and subjugates that other to strategies of exclusion.

Anth 4075. Cultural Histories of Medicine. (3 cr; #A-F only)
Introduction to historically informed anthropology of healing practices. Shift to biologically based medicine in Europe, colonialism dissemination of biomedical, political/cultural relations between biomedical and “ethnomedicines,” traffic of healing practices in a transnationalist world.

Anth 4980. Topics in Sociocultural Anthropology. (3-6 cr; max 6 cr; SP–1003 or #)
Special topics in all specializations of social and cultural anthropology. Topics specified in Class Schedule.

Anth 4990. Topics in Archaeology. Seminar. (3-6 cr; max 6 cr; SP–1001 or 3001 or #)
Discussion/review/analysis of specific current theoretical and/or methodological issues in anthropology. Topics specified in Class Schedule.

Anth 4991. Independent Study. (1-6 cr; max 6 cr; SP–#)
Under special circumstances and with the approval of the instructor, qualified students may register for a listed course on a tutorial basis.

Anth 4992. Directed Readings. (1-6 cr; max 6 cr; SP–#)
 Allows students to pursue special interests in anthropology through reading materials under the guidance of a faculty member.

Anth 4993. Directed Study. (1-6 cr; max 6 cr; SP–#)
 Allows students to pursue special interests in anthropology under the guidance of a faculty member.

Anth 4994W. Directed Research. (1-6 cr; max 6 cr; SP–#)
Qualified students may conduct a well-defined research project under the guidance of a faculty member.

Anth 5025W. Cultural Semantics. (3 cr)
Understanding cultures and cognitive classification systems through lexical semantics.

Anth 5027W. Origins of European Civilization. (3 cr; SP–53027)
Early development of European society, from Old Stone Age to Roman period. Principle transformations of European culture with introduction of agriculture, development of metallurgy and trade, and emergence of towns and cities.

Anth 5029. Philosophical Anthropology. (3 cr; SP–Sr or grad or #A-F only)
Advanced survey of traditional problems associated with broad-ranging views on human nature and culture. Specific arguments of relativists, behaviorists, phenomenologists, and others in relation to social life. Structuralist and post-structuralist approaches.

Anth 5033. Feminist Anthropology. (3 cr; SP–3047 or grad or #)
Advanced introduction to the development of feminist theory in anthropology. Theoretical and methodological shifts in feminist anthropology and ethnography. Feminist ethnography within the discipline as a whole; current debates concerning the reading and writing of ethnography.

Anth 5041. Ecological Anthropology. (3 cr; SP–53041, §6213; grad or #)
Concepts, theories, and methods of ecological anthropology (cultural ecology) show how humans interact with the biophysical environment. Compare biological and cultural interactions with the environment; examine adaptive strategies across culturally.
Applied Business (ABus)

College of Continuing Education

ABus 4011. Historical Perspectives and Contemporary Business Challenges. (3 cr; QP–Business intro course or #; SP–Business intro course or #; A-F only) Global competitiveness, product and service quality, information revolution, and changing customer and workforce demographics. Approaches to meeting these contemporary challenges studied against a historical backdrop of evolving management practices. Emphasis on developing systematic ways of analyzing complex problems.

ABus 4012. Problem Solving in Complex Organizations. (3 cr; QP–[3031 or #], Web access; must activate UM e-mail account before 1st class; SP–[3031 or #], Web access; must activate UM e-mail account before 1st class; A-F only) Open systems perspective. Analyzing root causes/ effects of problems/solutions across boundaries in organization. Process analysis as problem-solving tool. Problem-solving frameworks/processes. Techniques for analyzing root causes, expanding alternatives, predicting consequences, making choices.

ABus 4021. Small Group Behavior and Teamwork. (3 cr; QP–Sociology or psychology course or #; SP–Sociology or psychology course or #; A-F only) Dynamics of small-group behavior with emphasis on work groups in organizations. Factors affecting performance and productivity. Identify formal and informal roles providing a foundation for understanding how effective teamwork is created and sustained. Effective leadership skills and followership practiced.

ABus 4022. Managing Organizational Relationships. (3 cr; A-F only) Political dimensions of organization life and diagnosing how power is distributed and exercised in modern organizations. Cooperative relationships and frameworks for analyzing motives for observed behavior. Skills for managing upward, lateral, and downward relationships, with emphasis on recognizing potential ethical dilemmas.

ABus 4023. Communicating for Results. (3 cr; QP–English composition or #; SP–English composition or #; A-F only) Aspects of communication essential for being persuasive and influential. Organizing and presenting ideas effectively, strategies for audience analysis, choosing methods, making appropriate use of informal influence methods, and handling dissent. Processes for intercultural communication.

ABus 4024. Effective Oral Communication and Business Presentations. (1 cr; A-F only) Assists BAB students in building and developing business presentation skills and oral communications effectiveness. Videotaping and supportive critique of actual presentations based on audience analysis, technique selection, and handling both receptive and hostile audiences.

ABus 4025. Negotiating for Agreement. (1 cr; A-F only) Negotiating to reach high-quality/mutually satisfying agreements and build better working relationships. Practical tools, hands-on practice.

ABus 4031. Accessing and Using Information Effectively. (3 cr; QP–Computer intro course or #; SP–Computer intro course or #; A-F only) Information’s role in business operations. Typology of information available, case studies and exercises. Accessing external information using library resources such as information search services, CD-ROM, and periodicals. Accessing internal information using a desktop database system and electronic mail or computer conferencing.

ABus 4032. Quantitative Skills for Decision Making. (3 cr; QP–[Math for decision making, college algebra, statistics for decision making] or #; SP–[Math for decision making, college algebra, statistics for decision making] or #; A-F only) Exploratory data analysis, visual display of data, basic mathematical/statistical analysis. Decision theory/modeling.

ABus 4041. Leadership in a Global and Diverse Workplace. (3 cr; A-F only) Developing global and ethical perspectives and skills for working in settings with diverse personnel.

ABus 4042. Planning and Implementation at the Business Unit Level. (3 cr; A-F only) Creating and implementing operating plans. Operations planning, schedules, and staffing plans. Importance of integrating plans with the overall business strategy. Factors involved in successful implementation. Importance of developing strategies for change.

ABus 4043. Project Management in Practice. (3 cr; QP–[3031, intro to mgmt] or #; SP–[3031, intro to mgmt] or #; A-F only) Scheduling, coordinating, and allocating resources. Field project with nonprofit community organization, small business, or student’s employing organization.

ABus 4044. Tools for International Trade. (3 cr; A-F only) Emphasis on understanding international forces and trends and identifying ways in which businesses can work within the context of ongoing international change. Tools used in specific transactions and ways to diagnose in what circumstances they are most appropriately applied.


ABus 4103. Marketing and Sales. (3 cr; QP–Intro marketing or intro sales or #; SP–Intro marketing or intro sales or #; A-F only) Legal, behavioral, ethical, competitive, economic, and technological factors and how they affect product pricing, promotion, and marketing channel decisions. Personal selling function as integral part of distribution system. Sales force organization, selection, training, motivation, compensation, forecasting, budgeting, and control.

ABus 4104. Management and Human Resource Practices. (3 cr; A-F only) Emphasis on day-to-day leadership, including organizing work, motivating employees, delegating, coordinating, and achieving results. Human resource practices, including selection, induction, and training of new employees; employee appraisal; handling grievances; and discipline.

ABus 4501. Entrepreneurship. (3 cr; SP–To use as BAB capstone course must have completed 75% of BAB coursework; A-F only) Self-employment as alternative to employment. Phases of entrepreneurship, including identifying an opportunity, start-up, managing/harvesting a small business. Emphasizes all aspects of business plan.

ABus 4503. Technological Change, Work Organization, and Management Practices. (3 cr; A-F only) Evolution of work organization in the United States. Factors responsible for changes. Effect of changes on labor-management relations. Revolutions in technology, scientific management, collective bargaining, self-directed work teams, and lean production methods.

ABus 4505. Values and Ethics at Work. (1 cr; A-F only) Ways in which we look at work/our jobs. Religious, legal, social, cultural, and personal viewpoints. Topics may include pay equity/benefits, discrimination, product liability, corporate political contributions, loyalty, family/work conflicts, community responsibility, and role of business in society. Case examples.


ABus 4509. New Product Development. (1 cr; A-F only) How new consumer, industrial, and service products are planned/developed. Idea generation, concept/buyer testing, pricing, sales/profit strategies, product positioning, promotion, packaging/distribution. Marketing case histories. Student projects.


ABus 4515. Changing the American Workplace: Choice or Destiny? (3 cr; A-F only) Evolution of work organization. Revolutions in technology, scientific management, collective bargaining, self-directed work teams, and lean production methods. Limited to 25.

ABus 4901. Special Topics in Applied Business. (3 cr; SP–A; at least seven BAB courses recommended; A-F only) Management issues in a changing workplace. Topics vary.

ABus 4970. Directed Study. (1-3 cr; QP–BAB student; SP–A, BAB student; A-F only) Specially arranged projects, trips, or field work.

ABus 4999. Practicum. (3 cr; QP–BAB student at least 33 ABus cr, completed portfolio review, SP–BAB student at least 33 ABus cr, completed portfolio review, #; A-F only) Project in student’s employing organization or in organization providing an internship. Integrates projects from previous coursework or develops plan for new venture or expands existing business. Limited class meetings.
Applied Economics (ApEc)

Department of Applied Economics
College of Agricultural, Food, and Environmental Sciences

ApEc 1001. Orientation to Applied Economics. (1 cr; A-F only)
Introduction to curriculum offerings, liberal education requirements, employment opportunities, faculty in the Department of Applied Economics. Emphasizes historical development of the discipline, areas of specialization, coursework expectations, career planning.

ApEc 1101. Principles of Microeconomics. (3 cr [max 3 cr]) Theory of the household and firm; demand and supply; price determination; government in the market; market structures; agriculture and food; externalities and the environment; labor markets and unions; capital and interest; project evaluation; human capital.

ApEc 1102. Principles of Macroeconomics. (3 cr [max 3 cr]) Unemployment and inflation; measures of national income; macro models; fiscal policy and problems; taxes and the national debt; money and banking; monetary policy and problems; poverty and income distribution; government trade and exchange rates; economic growth and development.


ApEc 3000. Seminar in International Agriculture. (1 cr [max 3 cr]; QP-#) Presentation and discussion of students’ research papers, literature reviews of selected topics, or discussions by students and faculty of their experiences in international agriculture.

ApEc 3001. Applied Microeconomics: Consumers, Producers, and Markets. (4 cr; QP-1101, Econ 1101, Math 1142 or Math 1251, BA 1550 or Stat 1001; SP–1101, Econ 1101, Math 1142 or Math 1251, MAMS 1550 or Stat 1001)

ApEc 3002. Applied Microeconomics: Managerial Economics. (4 cr; QP–1250 or Act 1050, 3001 or #; SP–[[1251 or Act 2050], 3001] or #)
Microeconomic theory, its application to managerial problems. Introduction to regression analysis, demand analysis, demand function estimation, forecasting, cost function estimation, resource allocation decisions, linear programming, market structure, pricing policy, risk analysis, investment analysis.

The public sector and market economics; public goods, externalities, and other allocation issues; government and the stabilization of the national economy; overview of the new classical and Keynesian models; principles of taxation; individual income tax, sales, business, and property taxes.

ApEc 3007. Applied Macroeconomics: Policy, Trade, and Development. (3 cr; QP–2006 or #; SP–3006 or #)
Foreign trade, development, and growth. General equilibrium models show the affects of trading blocks on U.S. agriculture and the broader economy, the impacts of government policies, foreign trade, and policies that impact world trade and economic growth.

ApEc 3041. Economic Development of U.S. Agriculture. (3 cr; QP–Econ 1101, 1102, Econ 1101, 1102 or #; SP–1101, 1102, Econ 1101, 1102 or #)
Economic, political, social, and technical forces that have shaped the development of U.S. agriculture; the role of agricultural development in national economic development in the United States with implications for developing countries.

ApEc 3071. Agriculture and Economic Growth in Developing Countries. (3 cr; QP–Econ 1101, 1102, Econ 1101, 1102 or #; SP–1101, 1102, Econ 1101, 1102 or #)
Characteristics and performance of peasant agriculture; potential role of agricultural development, and design of economic policies to achieve agricultural and economic development; role of women in agricultural development.

ApEc 3311. Introduction to Public Policy Analysis. (3 cr; QP–Econ 1101 or Econ 1101, SP–1101, Econ 1101; A-F only)
Elements of public policy analysis; the policy analysts’ roles; market failure; public choice; bureaucratic decision making; public policies.

ApEc 3401. Markets, Marketing, and Prices. (2 cr; QP–1101 or Econ 1101, SP–1101 or Econ 1101)
Market structure; demand and supply structure; regulations and institutions that influence the behavior of firms in agricultural marketing systems; performance of food assembly, manufacturing, and distribution industries.


ApEc 3421. Livestock and Meat Marketing Economics. (2 cr; QP–3400 or #; SP–E3401)
Economic relationships in the marketing of livestock, dairy, and meat products; product grades; inspection and transportation; market structure, channels, pricing, and competition; government regulations and policies.

ApEc 3451. Food and Agricultural Sales. (3 cr) Professional selling of agricultural and food products. Build and refine sales abilities, identify and qualify prospects, deliver effective sales presentations, and close the sale; elementary principles of market research. Students develop and deliver a sales presentation.

ApEc 3501. Agribusiness Finance. (3 cr; QP–1250, Act 1050 or equiv, 3501 or #; SP–1251, Act 2050 or equiv)
Analysis of financing and investment strategies for agribusiness firms and their effects on liquidity, solvency, and profitability; analysis of financial institutions, markets, and instruments; management problems and issues facing financial intermediaries serving agriculture.

ApEc 3811. Principles of Farm Management. (3 cr; QP–1101 or Econ 1101, SP–1101 or Econ 1101)
Strategic and operations aspects of farm management; financial analysis, budgeting, strategic management, marketing and control, enterprise and whole farm planning and control; investment analysis, quality, risk, and personnel management.

ApEc 3821. Retail Center Management. (3 cr; QP–1101 or Econ 1101, 1250 or Act 1050, 3821 or #; SP–1101, Econ 1101, 1250 or Act 1050)
Management of garden centers, grocery stores, and other retail units selling perishable agricultural products.

ApEc 3991. Independent Study in Applied Economics. (1-4 cr; QP-#)
Independent study and supervised reading and research on subjects and problems not covered in regularly offered courses.
Course Descriptions

ApEc 5152. Applied Macroeconomics: Income and Employment. (2 cr; SP–Econ 5152 or #)
Students examine open economy models and simple business cycle models examine economic growth, business cycles, and fiscal and monetary policy. Input-output analysis and large scale econometric models. Sources and properties of economy and sector-wide data, and empirical applications.

ApEc 5321. Regional Economic Analysis. (3 cr;
QP–3006 or Econ 3102 or #; SP–3006 or Econ 3102 or #)
Regional development patterns and role of resources, transportation, and institutional constraints. Trade, migration, and investments in regional growth and change. Regional economic information in investment and location decisions. Evaluation of economic development policies and tools. Economic impact analysis.

ApEc 5341. State and Local Public Services and Finance. (3 cr;QP–3001 or equiv; SP–3001 or equiv; A–F only)
The organization, delivery, economic analysis and finance of state and local public services and functions.

ApEc 5401. Price Analysis, Futures, and Options Markets. (3 cr; QP–[3001 or equiv]; [Math 1142 or equiv];
SP–[3001 or equiv]; [Math 1142 or equiv])
Development, application of price models. Unique market institutions in agriculture that have been developed in response to marketing/pricing problems. Futures/options trading. Hedging, speculative uses of futures/options trading. Price efficiency, market performance/regularizations.

ApEc 5511. Labor Economics. (3 cr; QP–3101 or Econ 3101 or equiv or #; SP–3101 or Econ 3101 or equiv or #)
Theoretical foundations of labor markets, including intertemporal/household labor supply. Demand for labor in specific industries. Human capital theory, unemployment, migration decisions. Analysis of econometric research applied to labor policy issues such as minimum wage, tax policy, social insurance, education.

ApEc 5551. Food Marketing Economics. (3 cr;
QP–[FoodSci 5474, 5550; 3001 or Econ 3101; SP–5445, 5645; 3001 or Econ 3101; A–F only])

ApEc 5581. Advanced Agronomic Economics. (3 cr; QP–3101 or Econ 3101 or #)
Household economics and investment in human capital (e.g., children, education, health and nutrition); labor force participation, lifetime earnings, and nonmarket work; time allocation and substitution of capital for labor in the household in the western and third world.

ApEc 5611. Land and Water Economics. (3 cr; QP–3001 or Econ 3101 or #; SP–3001 or Econ 3101 or #)
Land as an economic and cultural resource. Property rights concepts, valuation of resources, and policy analysis. Materials drawn from economics, forestry, public finance, planning, and agriculture.

ApEc 5637. Agricultural Law. (3 cr; QP–3 or grad or #; SP–5 or grad or #)
Economic regulation of agriculture. Industrial organization and market structure in agribusiness, public lands and water law, agricultural cooperatives, farm labor, farm finance, crop insurance and disaster assistance, agricultural biotechnology, food and drug law, price and income regulations, and international agricultural marketing.

ApEc 5651. Economics of Natural Resource and Environmental Policy. (3 cr; QP–3001, 5610 or Econ 3101; SP–3001, 4611 or Econ 3101)
Economic analyses including project evaluation of current natural resource and environmental issues. Emphasis on intertemporal use of natural resources, natural resource scarcity or adequacy, environmental quality and mechanisms for pollution control, and their implications for public policy.

Arabic (Ar)

Department of Afro-American Studies
College of Liberal Arts

Arab 1101. Beginning Arabic. (4 cr)
Oral practice, reading, comprehension, basic grammar. For students with no previous training in Arabic.

Arab 1102. Beginning Arabic. (4 cr;SP–1101 or equiv or #)
Comprehension, oral practice, and reading of standard Arabic. Continuation of Arab 1101.

Arab 1201. Colloquial Arabic. (4 cr)

Arab 1202. Colloquial Arabic. (4 cr; SP–1201 or #)

Arab 3036. Islam: Religion and Culture. (3 cr; SP–5 Afro 5036)
Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, status in world societies—Asia, Europe, the Americas.

Arab 3101. Intermediate Arabic I. (4 cr; SP–1102 or equiv or #)
Advanced grammar and conversational practice. Reading Arabic texts.

Arab 3102. Intermediate Arabic II. (4 cr; SP–3101 or #)
Advanced grammar, analyses of readings, oral comprehension.

Arab 3491. Classical Islamic Civilization. (3 cr; SP–Afr 5491)
Islamic legacy in the classical age (800-1400), including medical and natural sciences, mathematics, philosophy, literature, and their transmission to Europe.

Arab 3505. Survey of the Middle East. (3 cr; SP–Arab 5505)
Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.

Arab 3514. African-Arabic Literature in Translation. (3 cr)
Literature from continental Africa in Arabic. Novels, short stories, poetry, and drama by such writers as Abdel-al-Hayy, Abdes-al-Sabur, Mahfouz, El-Suadawi, and Wattar. No knowledge of Arabic required.

Arab 3524. Introduction to the Qur’an. (3 cr)
Textual, thematic, interpretive, and narrative aspects of the Qur’an and its influence on modern Arabic literature. All readings in English.

Arab 3541. Islam in the Catholic Age: Arab Phase. 600 A.D. to 900 A.D. (3 cr; SP–Afr 5541)
The rise of Islam in its Arab setting: Roles of the prophet, the Orthodox and Umayyad Caliphs. Development of the Islamic state and empire. Status of Muslims and non-Muslims.

Arab 3542. Medieval Islam. (3 cr;SP–Arab 5542)
Islamic dynasties, Mamluks and Mongols, and Crusaders and Assassins. Abbadid Caliphate’s disintegration and rise of Seljuk Turks.

Arab 3543. Arabs Under Mamluks and Ottomans: 1300-1920. (3 cr;SP–Arab 5543)
Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt; dynastic struggles in Syria; rise of Young Turks; Arab revolt.

Arab 3544. Arab World: 1920 to the Present. (3 cr)
Struggle in the Arab world for independence and its course since independence. Emphasis on development, political stability and unity; political structures; the Arab-Israeli conflict.

Arab 3547. The Ottoman Empire. (3 cr)
Founding of Ottoman society and state to empire, 1300 to end of the empire in 1920. Lands, institutions, peoples, legacy, impact on Europe.

Arab 3900. Topics In Arabic Literature, Art, and Culture. (3 cr; max 6 cr)
Topics vary. Readings are in English.

Arab 3993. Directed Study. (1-3 cr; SP–#)
For advanced students with individual faculty members.

Arab 5001. Research Methods in Arabic Studies. (3 cr)
Skills and techniques required to deal with medieval and modern works in Arabic literature and Islam. A survey of the most important research bibliographies in Arabic and Islamic studies. Bibliographic references in English and, when appropriate, Arabic.

Arab 5011. Islam in Africa. (3 cr)
Ideological, doctrinal, and ritual aspects of continental African Islam. Emphasis on various religious brotherhoods and Sufi orders from different African countries in the 20th century. No knowledge of Arabic required.
Arab 5036. Islam: Religion and Culture. (3 cr; SP–§Afro 3036)
Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, status in world societies—Asia, Europe, Americas.

Arab 5101. Advanced Arabic I. (4 cr; SP–§3102 or equiv or #)
Advanced readings in classical and modern Arabic. Compositions based on texts.

Arab 5102. Advanced Arabic II. (4 cr; SP–§5101 or #)
Readings of Arabic texts. Writing compositions based on texts. Continuation of 5101.

Arab 5491. Classical Islamic Civilization. (3 cr; SP–§Arab 3036)
Islamic legacy in the classical age (800–1400), including medical/natural sciences, mathematics, philosophy, literature, and their transmission to Europe.

Arab 5501. Modern Arabic Poetry in Translation. (3 cr)
Free verse movement and its major trends: post-romantic, social realist, symbolist, resistance, prose poem. Emphasizes leading poets such as al-Mala’ika, al-Sayyab, al-Baytani, and Adunis. Theoretical/critical essays. All readings in English.

Arab 5502. Arabic Novel in Translation. (3 cr)
The novel as a new genre in Arabic literature. Trends: realist, psychological, existentialist, feminist, post-modernist, fantastic, experimentalist. Emphasizes major writers such as Mahfouz, Ghanem, Salih, Jabra, El Sa’idawi, Nafis, and Khouss. Theoretical/critical essays. Cultural/historical context.

Arab 5503. Arabic Drama in Translation. (3 cr)
Emergence and development of drama as a European-inspired genre in Arabic literature. Emphasizes major trends and playwrights. All readings in English.

Arab 5505. Survey of the Middle East. (3 cr; SP–§Arab 3505; [HIST 3505 or #])
Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.

Arab 5541. Islam in the Catholic Age: Arab Phase 600 A.D. to 900 A.D. (3 cr; SP–§Arab 3541)
The rise of Islam in its Arabian setting. Roles of the prophet, the Orthodox and Umayyad Caliphs. Development of the Islamic state and empire. Status of Muslims and non-Muslims.

Arab 5542. Medieval Islam. (3 cr; SP–§Arab 3542)
Islamic dynamism in the Mediterranean and Mongol and Crusaders and Assassins. Abbasid Caliphate’s disintegration and rise of Seljuk Turks.

Arab 5543. Arabs Under Mamluks and Ottomans: 1300–1920. (3 cr; SP–§Arab 3543)
Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt; dynastic struggles in Syria; rise of Young Turks; Arab revolt.

Arab 5544. Arab World: 1920 to the Present. (3 cr; SP–§Arab 3544)
Baseline courses in Arab world for independence and current course since independence. Emphasis on development, political stability and unity; political structures; the Arab-Israeli conflict.

Arab 5678. Seminar: African-Arabic Fiction in Translation. (3 cr)

Arab 5900. Topics in Arabic Literature and Culture. (3 cr [max 4 cr]; SP–§5102 or #)
Readings and discussion of selected works in Arabic. Topics specified in Class Schedule.

Arab 5992. Directed Readings. (1-3 cr; SP–§)
Individual research and readings for advanced students.

Arabic (Arm)
Department of Classical and Near Eastern Studies
College of Liberal Arts

Arm 5011. Biblical Aramaic and Old Aramaic Inscriptions. (3 cr; SP–§1 yr Hebrew or Arabic or #)
Biblical Aramaic—grammar, fluency in reading Biblical Aramaic and Old Aramaic inscriptions.

Arm 5012. Syriac. (3 cr; SP–§1 yr Hebrew or Arabic or #)
Emphasis on fundamentals of grammar and reading Syriac texts fluently.

Architecture (Arch)
Department of Architecture
College of Architecture and Landscape Architecture

Arch 1301. Introduction to Drawing in Architecture and Landscape Architecture. (3 cr; A-F only)
Development of basic skills involved in perceiving and representing the material environment. Study of sketching and drawing conventions of visual phenomena and forms.

Arch 1401. The Designed Environment. (3 cr; A-F only)
Examination of seminal issues in the designed environment, including relationships between place and space, and realms of the ideal and real, public and private. Survey of how the fields of architecture, landscape architecture, and urban design have explored these issues.

Arch 1421H. Honors: The Designed Environment. (3 cr; SP–§Fr or soph; honors; meets HON req; A-F only)
How seminal issues (e.g., relationships of place, space, idealital, public/private) have been reflected in, explored through architecture, landscape architecture, urban design.

Arch 3301. Drawing for Design in Architecture. (3 cr; SP–[(1301 or LA 1301), [pre-Arch or Arch or BED] or #] or A-F only)
Introduction to conceptual function of drawing in architecture. History of drawing in architecture, critical review of drawing conventions/systems, exploration of drawing processes.

Arch 3401W. Environmental Design and the SocioCultural Context. (3 cr; SP–[(1401 or LA 1401) or #] or A-F only)
The design of the built environment as a cultural and material product of a sociocultural process and expression of values, ideas, and behavioral patterns. Study of design and construction as a complex political process.

Arch 3411. Architectural History to 1750. (3 cr)
History of architecture and city planning from antiquity to 1750, as illustrated by major monuments from western and non-western cultures.

Arch 3412. Architectural History Since 1750. (3 cr)
History of structure, cities, sites, and theories of architecture and urbanism since 1750.

Arch 3490H. Honors Theory Seminar. (3 cr; SP–[CLA BA or CALA BA/ honors or #; A-F only])
Topics selected by faculty, from their area of scholarship, in contemporary issues from literature of architecture. Specific buildings or building types, or areas of architectural thought, history, representation, design, technology. See Class Schedule.

Arch 3631. Design in the Digital Age. (3 cr; A-F only)
Introduction to design, design process. Developing/understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project.

Arch 3993. Directed Study. (1-4 cr; SP–# only)
Guided individual reading or study.

Arch 5123. Architectural Thesis. (8 cr; SP–§5212, 5241, BA Arch major; students must submit thesis plan in semester before writing thesis; A-F only)
Student’s choice, study and solution of an architectural problem to demonstrate proficiency in all phases of design.

Arch 5241. Principles of Design Programming. (3 cr; SP–For undergrads 5122, BA Arch major; for grads M Arch major or #; SP–For undergrads 5122, BA Arch major; for grads 8255, M Arch major or #; A-F only)
Concepts and techniques of architectural programming, including space and activity analysis, site selection, precedent study, code review, appropriate technology identification, hypothesis formulation and evaluation. Emphasis on conceptual development, research, and analytic drawing.

Arch 5281. Undergraduate Architecture Studio I. (6 cr; SP–[(3411 or 3412), Arch major] or #; A-F only)
Architectural questions in settlement patterns, architectural elements in their formal organization. Mapping techniques, orthographic projections, analytic drawing, models.

Arch 5282. Undergraduate Architecture Studio II. (6 cr; SP–§5281, Arch major or #; A-F only)
Exploration of historical and modern forces of gravity, light, and air and their influence on the organization of material form to create places of human habitation.

Arch 5283. Undergraduate Architecture Studio III. (6 cr; SP–§5281, 5282, Arch major or #; A-F only)
Exploration of selected design issue or topic, its influence on organization of material form to create places of human habitation.

Arch 5291. Accelerated Undergraduate Architecture Studio. (6 cr; SP–§5281, accelerated status) or #; A-F only)
Architectural problems developed by faculty to deepen/enrich ideas introduced in required architectural studio sequence.

Arch 5292. Accelerated Undergraduate Architecture Studio II. (6 cr; SP–§5291, accelerated status) or #; A-F only)
Architectural problems. Emphasizes development of structures as integral part of design, site planning, design process.

Arch 5311. Theory of Architectural Representation. (3 cr; SP–3311, 3372, Arch grad or #; A-F only)
Integration of emerging computer graphics with photography and architectural graphic conventions. Explores historical, theoretical, and critical issues of representation and the influence of visual media on the architectural field.

Arch 5313. Visual Communication Techniques in Architecture. (3 cr; SP–For undergrads 3311, BA Arch or BED major; for grads M Arch major or #; SP–For undergrads 3311, BA Arch or BED major; for grads M Arch major or #; A-F only)
Exploration of delineation, presentation, and design techniques, using various visual media and methods of investigation.

Arch 5321. Architecture in Watercolor. (3 cr; SP–§3311, [Arch or BED] or M Arch grad student or #; SP–3301, [Arch or BED] or M Arch grad student or #; SP–3301, [Arch or BED] or M Arch grad student or #; Watercolor as a tool in the design process. Survey of foundation principles, techniques, medium, tools, and materials. Exploration of color relationships, mixing, composition, and applications to design.

Arch 5350. Topics in Architectural Representation. (1-3 cr [max 9 cr]; SP–Arch major or M Arch major or #; A-F only)
Selected topics in architectural representation.

Arch 5351. AutoCAD I. (3 cr; SP–§For undergrads 5281, Arch major; for grads M Arch major or #; may not be taken for graduate credit)
Basic concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release. Strategies and techniques for producing dimensioned and annotated drawings suitable for plotting and an introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5352. AutoCAD II. (3 cr; SP–For undergrads 5351, Arch major for grads M Arch major or #; may not be taken for graduate credit)
Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release. Strategies and techniques for producing dimensioned and annotated drawings suitable for plotting and an introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.
Course Descriptions

drawing suitable for plotting. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5361. Topics in Architectural Representation. (3 cr; SP–For undergrads 5281 or 5351, Arch major; for grads M Arch major or #; A-F only)
Introduction to 3-D studio for architectural modeling, rendering, and animation. Video recording and editing.

Arch 5371. Computer Methods I. (1 cr; SP–5251, M Arch major or #; S-N only)
Introduction to current techniques, computer programs, and their application to architectural computing and design.

Arch 5372. Computer Methods II. (1 cr; SP–5371, 5252 and M Arch major or #)
Current techniques, computer programs, and their application to architectural computing and design.

Arch 5373. Computer Methods III. (1 cr; SP–5372, 5253, M Arch major or #; S-N only)
Advanced techniques, computer programs, and their application to architectural computing in design, theory, and technology.

Arch 5374. Computer Methods IV. (1 cr; SP–5373, 5254, M Arch major or #)
Advanced architectural computing applications in design, history, theory, representation, and technology.

Arch 5381. Introduction to Computer Aided Architectural Design. (3 cr; SP–Arch or BED or M Arch or grad student in LA or #; A-F only)
2-D drawing, 3-D modeling/animation, printing, plotting. Electronic networking/communications, database management, spreadsheet analysis, land-use analysis, project management.

Arch 5382. Computer Aided Architectural Design. (3 cr; SP–5381, undergrad (BA Arch major or BED major) or M Arch major or graduate LA major or #; A-F only)
2-D & 3-D CAD, image manipulation. Advanced multimedia visualization techniques for design, including solid modeling, photo-realistic imaging, animation, video-editing/recording.

Arch 5410. Topics in Architectural History. (1-3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #)
Advanced study in architectural history. Readings, research, and seminar reports.

Arch 5411. Principles of Design Theory. (3 cr; SP–M Arch major or #; A-F only)
Principles of design and their instrumentation. How and why architecture theory is generated. Types and significance of formal analysis. Theoretical positions and modes of criticism.

Arch 5423. Gothic Architecture. (3 cr; SP–For undergrads 3411, arch major; for grads M Arch major or #; A-F only)
History of development of architecture and urban design in Western Europe from 1150 to 1400.

Arch 5424. Renaissance Architecture. (3 cr; SP–For undergrads 3411, arch major; for grads M Arch major or #; A-F only)
History of architecture and urban design in Italy from 1400 to 1600. Emphasis on major figures (Brunelleschi, Alberti, Bramante, Palladio) and the evolution of major cities (Rome, Florence, Venice).

Arch 5425. Baroque Architecture. (3 cr; SP–For undergrads 3411, arch major; for grads M Arch major or #; A-F only)
Architecture and urban design in Italy from 1600 to 1750. Emphasis on major figures (Bernini, Borromini, Cortona, Guarini) and the evolution of major cities (Rome, Turin).

Arch 5426. Architecture and Nature: 1500-1750. (3 cr; SP–For undergrads 3411, 3412, arch major; for grads M Arch major or #)
History of the interaction of architecture and nature in Italy, England, and France in the 16th and 17th centuries. Major monuments, their relationship to theories of architecture and gardening, urban and rural life.

Arch 5431. 18th-Century Architecture and the Enlightenment. (3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
Architecture, urban planning, and garden design in Europe from 1700 to 1850.

Arch 5432. Modern Architecture. (3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
Architecture and urban design in Europe and the United States from the early 19th century to World War II.

Arch 5434. Contemporary Architecture. (3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
Developments, theories, movements, and trends in architecture and urban design from World War II to the present.

Arch 5439. History of Architectural Theory. (3 cr; SP–For undergrads 3412, arch major; for grads M Arch major or #; A-F only)
History of architectural theory from antiquity to the 20th century.

Arch 5450. Topics in Architectural Theory. (1-3 cr; max 9 cr; SP–Arch major or M Arch major or #; A-F only)
Selected topics in architectural theory and criticism.

Arch 5451. Architecture: Defining the Discipline. (3 cr; SP–M Arch major or #; A-F only)
Architecture as a discipline: its nature, role, purpose, and meaning discussed within a general, philosophical, and theoretical framework.

Arch 5454. Semiotics and Deconstruction in Architecture. (3 cr; SP–5401, M Arch major or #; A-F only)
Expressive and cultural dimensions of architecture, especially those related to linguistic analogies, knowledge production, and contemporary philosophy. Broad critical perspective of architectural discussion and argumentation addressing current issues.

Arch 5455. Typology and Architecture: Theories of Analysis and Synthesis. (3 cr; SP–5401, M Arch major or #; A-F only)
Theoretical traditions and development of typology’s role in architecture. Investigates works of Laugier, Quatremere de Quincy, Viollet-Le Duc, Ledoux, Durand, Camillo Sitte, and Le Corbusier. Recent developments and theoretical positions of neo-rational and contextual arguments for contemporary applications of the idea of type.

Arch 5458. Architecture and Culture. (3 cr; SP–5412, arch major or grad student or #; A-F only)
Architectural as a cultural medium. Relationships among architecture, people, and culture; research findings and design; vernacular and high style architecture. Physiological and symbolic messages; reception theory and sociocultural critique and change; implications for architectural practice.

Arch 5459. Gender and Architecture. (3 cr; SP–Arch or WoSt major or M Arch major or #)
Examination of ideas related to gender and architecture, gendered and non-gendered places and practices, and their relations to cultural norms and change.

Arch 5461. North American Indian Architecture. (3 cr; SP–For undergrads 3412, arch or Amin major; for grads M Arch major or #)
Historic and contemporary principles and theories of North American Indian architecture. Study of the culture, technology, environment, art and craft of North American Indians in their settlements and architecture.

Arch 5501. Environmental and Material Forces in Architecture. (4 cr; SP–5351, M Arch major or #; A-F only)
Exploration of relationship between architectural form, human experience, and building technologies. Design principles and concepts of environmental technology (microclimate, thermal, luminous design) and building technology (materials, methods of construction, structure). Impact of ecological issues, construction materials, and structural systems on architectural design.

Arch 5511. Construction Materials in Architecture. (3 cr; SP–M Arch major or #; A-F only)
Study and analysis of building materials, assemblies, and construction operations shaping building designs. Examination of material properties for design and detailing of building systems, elements, and components, and their implications in design applications. Modeling and hands-on building experiences.

Arch 5512. Building Methods in Architecture. (3 cr; SP–5511, M Arch major or #; A-F only)
Analysis of architectural materials, building systems, and construction operations related to enclosure systems design, building infrastructure, and detailing. Application of legal constraints and regulations (e.g., ADA, building codes, life-safety issues) in preparation of drawings, specifications, and construction documents for building design.

Arch 5513. Environmental Technology I: Thermal Design in Architecture. (3 cr; SP–M Arch major or #; A-F only)
Thermal and climatic issues in the design of small and mid-size buildings. Investigations in built and mechanical methods to modify climate. Evaluation of the impact of design techniques on energy use, the environment, and architectural meaning.

Arch 5514. Environmental Technology II: Lighting and Acoustic Design. (3 cr; SP–M Arch major or #; A-F only)
Principles of daylighting, electric lighting, and acoustic design in architecture. Relationship between luminous and acoustic environments, human comfort and architectural experience. Analytical methods, design process, and modeling of daylighting.

Arch 5525. Design in Masonry. (3 cr; SP–5521, M Arch major or #; A-F only)
Design principles, construction methods, and document production for masonry structures.

Arch 5539. Daylighting and Architecture Design. (3 cr; SP–5531, M Arch major or #; A-F only)
Role of daylighting in architectural design: principles, strategies, energy and environmental issues, psychology of light, color, and integration of electric lighting. Design projects investigate qualitative and quantitative issues through drawing, physical models, and photometric analysis.

Arch 5542. Building Energy Systems. (3 cr; SP–5541, M Arch major or #; A-F only)
Understanding functions of building mechanical systems and their integration with other building components through case studies. Residential and commercial HVAC systems, alternative energy sources, energy efficiency, structural implications of mechanical systems, sustainability, and environmental control strategies.

Arch 5550. Topics in Architecture Technology. (1-3 cr; max 6 cr; SP–Arch or M Arch major or #)
Selected topics in architecture technology, including construction, environmental management, energy performance, lighting, or materials.

Arch 5561. Building Production Processes. (3 cr; SP–5561, M Arch major or #; A-F only)
Introduction to design-build processes including document production, contract execution, and building project management. Case study and hands-on experiences examine construction industry organization, scheduling, consultant relations, legal and code restraints, contractual stipulations, budget and project resource allocations.
Arch 5571. Architectural Structures I: Wood and Steel Design. (3 cr; SP–M Arch major or #A-F only) Influence of history and culture on architecture and structure. Fundamentals of structural mechanics, structural analysis, structural form finding, and structural design by experimental, qualitative/intuitive, and quantitative methods. Vector-active and form-active structural systems, funicular structures, bending and compression elements, plates and grids, tensile architecture, shells. Description of traditional construction materials.

Arch 5572. Architectural Structures II: Concrete and Masonry Design. (3 cr; SP–5571 M Arch major or #; SP–5571 M Arch major or #A-F only) Overview of advanced materials: reinforced fiberglass, structural glass, and structural tensile fabrics. Impact of construction technology on architecture and methods of integrating knowledge of structural materials and construction methods into the design process.

Arch 5611. Design in the Digital Age. (3 cr; QP–Grad student or upper level undergrad student; SP–Grad student or upper level undergrad student; A-F only) Introduction to design, design process. Developing/understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project.

Arch 5621. Professional Practice in Architecture. (3 cr; SP–M Arch major or #A-F only) Legal, ethical, business, and practical requirements of architectural practice. Contemporary and historical models of contract formation, business principles, accounting, project management, design services, and marketing.

Arch 5631. Legal Contracts in Architecture. (3 cr; SP–M Arch major or #A-F only) Legal subject matter relevant to the work of architects and design professionals.

Arch 5645. Real Estate Development in Architecture. (3 cr; SP–For undergrads BA Arch major; for grad M Arch major or #) Fundamentals of real estate development and investment building. Processes and rules of specialists in development of investment projects. Topics include pro forma value and depreciation, tax shelter, feasibility, market analysis, appraisal equity financing, design, construction, leasing, and property management.

Arch 5650. Topics in Architectural Practice. (1-3 cr) SP–M Arch major or #5621, Arch major or #5621, M Arch major or #) Topics in architectural practice, methods of design production, marketing, operation, and relationships among clients, architecture, and society.

Arch 5670. Topics in Historic Preservation. (1-3 cr; SP–Arch or M Arch major or #) Selected topics in the theory, philosophy, research, and methods of architectural historic preservation.

Arch 5671. Historic Preservation. (3 cr; SP–3412 or #) Philosophy, theory, and origins of historic preservation. Historic archaeology and research, descriptive analysis, and documentation of historic buildings. Government’s role in historic preservation, preservation standards and guidelines, preservation and building codes, neighborhood preservation, preservation advocacy, and future directions for historic preservation. Research on architectural and historical aspects of historic sites using primary and secondary resources and on controversial aspects of preservation.

Arch 5672. Historic Building Conservation. (3 cr; QP–3412, 5411 or #SP–3412, 5671 or #) Historic building materials, systems, and methods of conservation. Discussion of structural systems building repair and pathology, introduction of new environmental systems in historic buildings, and conservation of historic interiors. Research on historic building materials and techniques using primary and secondary resources and on documentation of a specific historic site through large-format photography and measured drawings.

Arch 5673. Historic Building Research and Documentation. (3 cr; QP–3412, 5411 or #SP–3412, 5672 or #) Philosophy, theory, and methods of historic building research, descriptive analysis of buildings, building documentation, historical archaeology, and architectural taxonomy.

Arch 5711. Design Principles of the Urban Landscape. (3 cr; SP–Arch or BED major or M Arch or LA grad major or #A-F only) Art and design of creating city, neighborhood, and development plans. Public policies, planning tools and process, and physical models used by design professionals and private and civic institutions to shape the physical environment.

Arch 5724. Meanings of Place. (3 cr; SP–Arch or BED or Geog major or M Arch or LA grad major or #A-F only) Analysis of meanings and messages of surroundings, and examination of links between sense of place and feelings of well-being. Exploration of what present-day environments can reveal about the past. Survey of Twin Cities’ central district and selected neighborhoods, and other settings inside and outside Minnesota.

Arch 5750. Topics in Urban Design. (1-3 cr; SP–Arch or M Arch major or #A-F only) Special topics in theory and practice of urban design.

Art 5993. Directed Study. (1-4 cr; SP–Grad student or upper level undergrad student; A-F only) Guided individual reading or study.

Art (ArtS) Department of Art College of Liberal Arts


ArtS 1101. Drawing. (4 cr) Introduction to fundamental principles and processes of drawing; exploration of various drawing media. Work from still life, nature, the life model, and imagination.

ArtS 1102. Painting. (4 cr) Introduction to painting with attention to understanding and applying the fundamental principles of spatial organization and color interaction.

ArtS 1301. Sculpture. (4 cr) An introduction to sculptural practice examining materials, methods, concepts, and history with emphasis on the correlation between concepts and materials. Work in clay, plaster, metal, and wood.


ArtS 1505. Papermaking. (4 cr) Introduction to approaches, forms, and aesthetic possibilities of paper as an expressive medium. Studio work in both Eastern and Western traditions and sculptural applications.

ArtS 1601. Electronic Art. (4 cr) Introduction to the use of computer technologies as a source for creative art making. Emphasis on producing digital fine art in the context of computer based ideas such as interactivity, virtuality, agency, and community.

ArtS 1701. Photography. (4 cr) Presents conceptual, technical, and historical aspects of photography within the fine arts context. Emphasis on the creative process through hands-on experience in use of camera, film development, enlarging, and printing.

ArtS 1801. Ceramics. (4 cr) Fundamentals of wheel-thrown and hand-built ceramics as forms of creative expression. Introduction to clay, glazes, and firing techniques.

ArtS 1905. Freshman Seminar. (3 cr [max 6 cr]; SP–Fr or max 36 cr; A-F only) Topics specified in Class Schedule.

ArtS 1910. Topics: Freshman Seminar. (3 cr; SP–Fr or max 36 cr; A-F only) Topics specified in Class Schedule.

ArtS 3101. Intermediate Drawing. (4 cr; SP–1001, 1101) Further exploration and understanding of drawing elements with emphasis on developing visual judgment, drawing process, and execution. Specific problems to promote the understanding of pictorial structure and personal expression.

ArtS 3102. Intermediate Painting. (4 cr; SP–1001, 1101, 1102) Emphasizes development of visual sensibility, individual direction, critical judgment.

ArtS 3105. Dimensional Painting. (4 cr; SP–1001, 1101, 1102) Application of two-dimensional visual concerns as they relate to sculptural form. Exploration of how painting ideas affect perception of real space.

ArtS 3106. Drawing: Interpreting the Site. (4 cr; SP–1001, 1101) Field trips to draw or paint in various metropolitan area locations. Site interpretation, experimentation with marks/symbols. Focuses on search for personal content as inspired by site.


ArtS 3112. Life Drawing II. (4 cr; SP–3111 or #) The human form in pictorial structure, single, and multiple figure compositions. The creative process, work toward a personal direction. Attention to representation of the human image in cultural, historical, and contemporary context.


ArtS 3303. Sculpture: Metalcasting. (4 cr; SP–1001, 1301) Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts.


Course Descriptions

Arts 3307. Sculpture: Traditional Approaches. (4 cr; SP–1001, 1301)
Clay modeling of human figure, other forms. Moldmaking, plaster casting with historical/contemporary systems. Studio practice, investigation of traditional sculptural methods/concepts.

Arts 3401W. Critical Theories and Their Construction From a Studio Perspective. (3 cr; SP–1001, jr; or #)
Prerequisites—theories that shape the analysis of works of art. Evaluation of works from the artist’s perspective. Theory as an organizational structure from which to understand contemporary works.

Arts 3402. Artists’ Books. (4 cr; SP–1001; one visual art course, max 12 cr)
Study/creation of unique, handmade books using various structures, media, techniques. Critical, historical, theoretical issues surrounding contemporary book arts.

Arts 3403. Women’s Images and Images of Women. (3 cr; SP–1001 or #)
Women’s place in Western art from the artist’s perspective. Women as artists and the imagery they have created. Women as the object of imagery and the social and political attitudes those images convey. Survey of women artists from late-Renaissance through contemporary feminism; relevant issues.

Arts 3411H. Honors Tutorial in Visual Arts. (1-4 cr; max 6 cr; SP–Honors, # A-F only)
Individual consultation with a faculty member on visual work, research project, presentation, paper, or bibliography.

Arts 3413H. Honors Exhibition. (2 cr; SP–Magna or Summa Honors candidate, #; A-F only)
Advanced problems in studio and research, leading to a major/summa exhibition.

Arts 3416H. Honors Thesis. (1 cr; SP–Summa level honors candidate, #; A-F only)
Summa thesis paper written in support of honors exhibition or in relation to candidate’s visual/conceptual interests.

Arts 3444. Major Project. (1 cr; SP– # S-N only)
Individually designed independent project or exhibition.

Arts 3496. Internship in the Arts. (1-4 cr; SP–Art major, #; A)
Field work at local, regional, national, or international arts organization or with professional artist provides experience in activities/administration of art-based organizations.

Arts 3499. Internship at Katherine E Nash Gallery. (3 cr; SP–1001, #)
Hands-on experience in day-to-day operation/mision of Department of Art’s professional gallery.

Arts 3501. Printmaking: Intaglio and Screen. (4 cr; SP–1001, 1501)
In-depth investigation of intaglio/screenprinting. Application of traditional/contemporary techniques. Emphasizes individual artistic expression. Review of historical/cultural development of the medium.

Arts 3502. Printmaking: Relief and Lithography. (4 cr; SP–1001, 1501)
Expressive/formal aesthetics of woodcut relief, hand lithography. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary uses.

Arts 3505. Papermaking as an Art Form. (4 cr; SP–1001, 1505)
Further exploration of Eastern, Western, and sculptural applications of papermaking as an art form. Development of visual vocabulary through experimentation and focused inquiry into historical and contemporary methods.

Arts 3601. Interactive Art on the Web. (4 cr; SP–1001, 1601) or #
Using the Web as medium for creating interactive art. Emphasizes building computer technologies into agents of individual expression. Contemporary issues. Developing personal direction.

Arts 3602. Digital Art: Time and Interactivity. (4 cr; SP–1401, 1602/SP–1001, 1601)
Time-based art using digital/electronic media. Building interactive computer technologies into agents of individual expression.

Arts 3701. Photography: Silver Processes. (4 cr; SP–1001, 1701)
Classical photographic practice, concentrating on camera/chemical manipulation. Historical overview of the medium. Conceptual/contemporary approaches to traditional themes.

Arts 3702. Photography: The Extended Image. (4 cr [max 12 cr]; SP–1001, 1701)
Manipulation of photo image using various camera and darkroom methods, including sequence, multiplicity, narrative, and book formats. Marking and altering photographic surfaces, applied color, and toning. Use of the photograph in interdisciplinary projects.

Arts 3703. Photography: Digital Imaging. (4 cr [max 12 cr]; SP–1001, 1701)
Photographic digital imaging in fine arts. Manipulation, computer applications. Editing in photo imaging software.

Arts 3801. Ceramics: Wheel Throwing. (4 cr; SP–1001, 1801)
Expands wheel-throwing skills, develops aesthetic awareness of ceramic forms. Kiln firing, glaze formulation.

Arts 3802. Ceramics: Handbuilding. (4 cr; SP–1001, 1801)

Arts 3803. Ceramics: Mold Making. (4 cr; SP–1001, 1801)
Introduction to plaster mold making for ceramics. Plaster mold fabrication, ceramic production, contemporary methods/concepts. Development of personal visual expression.

Arts 3804. Neon. (4 cr; SP–1001)
Introduction to neon sculpture; investigating materials, methods, concepts, history, and studio procedures. Work with glass tubing, electrical components, mixed media, and installation.

Arts 5104. The Nature of Abstraction. (4 cr; SP–3102 or #)
Exploration of abstraction as concept. Studio practice with attention to developing individual work. Emphasizes understanding topics relevant to abstraction. Approached from discipline of painting, open to various material sensitivities.

Arts 5105. Advanced Dimensional Painting. (4 cr; SP–3105 or #)
Illusionary space applied to sculptural forms. Practical applications of spatial/painterly concepts. Emphasizes critical/visual judgment. Development of cohesive body of work reflecting interaction of twodimensional dimensions.

Arts 5106. Advanced Drafting: Interpreting the Site. (4 cr; SP–3106 or #)
Search for personal content as inspired by site. Field trips (2/3 of course) to draw or paint from various metropolitan area locations. Interpretations enhanced by experimentation with symbols/notations. Selected topics and intensive studio activity. Various media. Various aesthetic/conceptual approaches.

Arts 5110. Advanced Drafting: Watercolor. (4 cr [max 12 cr]; SP–3102 or #)

Arts 5310. Advanced Sculpture: Direct Metal. (4 cr [max 12 cr]; SP–3501 or #)
Direct metal sculpture in steel, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculpture imagery.

Arts 5320. Advanced Sculpture: Spatial Problems. (4 cr [max 12 cr]; SP–3502 or #)
Sculptural practice out of traditional media/approaches. Installation, theater, public art, architecture as topics for individual investigations into spatial organization.

Arts 5330. Advanced Sculpture: Metal Casting. (4 cr [max 12 cr]; SP–3503 or #)
Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery.

Arts 5340. Advanced Sculpture: Carving and Construction. (4 cr [max 12 cr]; SP–3504)

Arts 5350. Advanced Sculpture: Kinetics. (4 cr [max 12 cr]; SP–3305 or #)

Arts 5360. Advanced Performance Art and Installation. (4 cr [max 12 cr]; SP–3306 or #)
Studio practice in performance art and installation; investigation of historical and contemporary methods and concepts of interdisciplinary expression. Development of personal imagery.

Arts 5370. Advanced Sculpture: Traditional Approaches. (4 cr [max 12 cr]; SP–3307 or #)

Arts 5400. Seminar: Concepts and Practices in Art. (3 cr [max 6 cr]; SP–1001 or #)

Arts 5402. Artists’ Books. (4 cr; SP–3402 or #)
Advanced projects in creation of unique, handmade books using various structures, media, techniques. Critical, historical, theoretical issues surrounding contemporary book arts.

Arts 5403. Women’s Images and Images of Women. (3 cr; SP–1001 or #)
Women’s place in Western art from the artist’s perspective. Women as artists and the imagery they have created. Women as the object of imagery and the social and political attitudes those images convey. Survey of women artists from late-Renaissance through contemporary feminism; relevant issues.

Arts 5405. Visual Narrative Structures. (4 cr; QP–1401, one 1xxx art course) or SP–1001, one 1xxx art course) or #
Visual/verbal investigation of structures of visual narratives. Contemporary efforts to integrate cogent images in visual texts. Development of methods for personal visual communication of cultural, spiritual, aesthetic, environmental experiences. Historical/cultural focuses. Studio work.

Arts 5441. Professional Practices. (3 cr; SP–Grad or #)
Intensive writing seminar provides a context for theoretical issues, business practices, and professional skills required for career management and development in the visual arts.

Arts 5490. Workshop in Art. (1-4 cr [max 12 cr])
Selected topics and intensive studio activity. Topics vary yearly.

Arts 5510. Advanced Printmaking: Intaglio and Screen. (4 cr [max 12 cr]; SP–3501 or #)
In-depth research of intaglio, screen printing.
ArTH 1903. Topics: Freshman Seminar. (3 cr [max 6 cr]; SP–Fr or no more than 36 cr; A-F only)
Topics specified in Class Schedule.

ArTH 1921W. Introduction to Film Study. (4 cr; SP–§CSCL 1921)
Fundamentals of film language, major theories of cinema. Detailed analysis of several films, including JohnFord’s Stagecoach, Jean-Luc Godard’s Breathless.

ArTH 3005. American Art. (4 cr)
Survey of American art from colonial to the present with special emphasis on the relationship of painting, sculpture, the decorative arts, architecture, costume, and material culture to current interpretations of American history.

ArTH 3008. History of Ancient Art. (4 cr)
Architecture, sculpture, and painting of selected early cultures; emphasis on influences contributing to the development of Western art.

ArTH 3009. History of Medieval Art. (4 cr)
Emphasis on principal monuments, their decoration and function (e.g. Old St. Peter’s, Rome; Hagia Sophia, Istanbul; Palace Chapel, Aachen; St. Sernin, Toulouse; Cathedral of Chartres, Paris, Rheims).

ArTH 3011W. History of Renaissance and Baroque Art. (4 cr)
Major architects, sculptors, and painters in Western Europe from the 15th through the 18th centuries (e.g. Brunelleschi, Michelangelo, Raphael, Leonardo, Caravaggio, Bernini, Rembrandt, Rubens, Poussin, Watteau).

ArTH 3012. History of 19th- and 20th-Century Art. (4 cr)
Major monuments and issues of modern period: sculpture, architecture, painting, and prints. Movements include neo-classicism, romanticism, realism, impressionism, evolution of modernism, symbolism, fauvism, cubism, dadaism, surrealism, abstract expressionism, pop art, conceptualism, and post-modernism.

ArTH 3013. Introduction to East Asian Art. (4 cr)
A selective examination of works of art produced in China, Korea and Japan from the neolithic era to modern times. Nearly every major type of object and all major styles are represented.

ArTH 3014W. Art of India. (4 cr)
Indian sculpture, architecture, and painting from the prehistoric Indus Valley civilization to the present day.

ArTH 3015W. Art of Islam. (4 cr)
Architecture, painting, and other arts from Islam’s origins to the 20th century. Cultural and political settings as well as themes that unify the diverse artistic styles of Islamic art will be considered.

ArTH 3017. Islamic Culture. (4 cr)
Emphasis on visual arts and literature produced by the Muslim world from Spain to the Indian sub-continent. Analysis of original visual and literary sources will form the basis for understanding diverse cultural developments.

ArTH 3025. Classical Myth in Western Art. (4 cr)
An exploration of the role of myth in the visual arts through examination of major figures and stories that became popular in the ancient world and have fascinated artists and audiences ever since.

ArTH 3142. Art of Egypt. (4 cr)
Arts and architecture of Egypt from prehistoric times to the emergence of modern Egypt, with emphasis on elements of continuity and change that have shaped Egyptian culture.

ArTH 3152. Art and Archaeology of Ancient Greece. (4 cr)
Introduction to the civilization of ancient Greece through art and material culture. Case studies of selected monuments and sites.

ArTH 3162. Roman Art and Archaeology. (4 cr)
Introduction to the art and material culture of the Roman World: origins, changes and continuities, “progress” or “decay” in the later Empire, legacy to the modern world.

ArTH 3201. The Olympic Games. (3 cr)
Surveys the Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

ArTH 3303. 17th- and 18th-Century Painting in France. (4 cr)
Survey of French painting from Baroque through beginnings of Neo-Classicism (e.g., De la Tour, Le Nain, Vouet, Poussin, Watteau, Boucher, Chardin, David).

ArTH 3422. History of Graphic Arts: 1780 to 1980. (4 cr)
History and theory of the creation of lithography, social caricature (e.g., Daumier, Gavarni), the revival of etching (e.g., Goya and mid-century practitioners, Whistler), and color lithography (e.g., Toulouse-Lautrec, Vuillard, Bonnard). Media changes of 20th century; the revolutionary nature of new media.

ArTH 3464. Art Since 1945. (4 cr)
Broad chronological overview of U.S./international art movements since 1945. Assessment of critical writings by major theoreticians (e.g., Clement Greenberg) associated with those movements. Theoretical perspective of postmodernism.

ArTH 3484. The Art of Picasso and the Modern Movement. (4 cr)
Works of Picasso in all media. Blue, Rose, Cubist, Classical, and later periods of Picasso’s development against innovations in media; collage, utilization of found-objects, printmaking and ceramics. Autobiographical nature of imagery gives methodological basis for exploring frequently personalized themes.

ArTH 3575. The Art of Walt Disney in American Culture. (4 cr)
Walt Disney, his companies, and the influence of their products on 20th Century American culture. Animation, architecture, city planning, the relationship between the fine arts and popular culture, and the creation of art under industrial conditions of collaboration and profit.

ArTH 3576. American Popular Culture. (3 cr)
American popular culture in the 19th and 20th centuries; fashion, greeting cards, holiday celebration, public spectacle, magazine covers, and commercial design.

ArTH 3578. Arts in Africa. (4 cr)
Surveys the diverse arts of Africa, from antiquity to present. Introduces visual arts of several civilizations and their relation to larger cultural issues (e.g., religion, cosmology, gender, identity, political power).

ArTH 3588. Architecture of Africa, Pre-Colonial to Present. (4 cr)
Introduces the history of architecture in West Africa, from eighth century to present. From the prosperity of early empires of Western Sudan (Ghana, Mali, Songhai), and the impact of Islam on traditional architecture, to colonial/post-colonial architecture.

ArTH 3921W. Art of the Film. (4 cr)
History of the motion picture as an art form; major films, directors, genres, and styles. Films discussed include The Birth of a Nation, Citizen Kane, Bicycle Thief, Rashomon, and Jules and Jim.

ArTH3927. Documentary Cinema. (4 cr)
History of nonfiction filmmaking, from early forms of reportage and birth of documentary to emergence of “film-verite” and “guerrilla television” and work by independents (e.g., Errol Morris, Michael Moore).

ArTH 3930. Junior-Senior Seminar. (3 cr; SP–[Jr or sr] Art major; SP–Honors [Jr or sr]; A-F only)
Major art-historical theme, artist, period, or genre. Topics specified in Class Schedule.

ArTH 3930H. Honors Junior-Senior Seminar. (3 cr; QP–Honors [jr or sr] Art major; SP–Honors [jr or sr] Art major; A-F only)
Major art-historical theme, artist, period, or genre.
Course Descriptions

Arth 3940. Topics in Art History. (1-4 cr) Topics specified in Class Schedule.

Arth 3971V. Honors Major Project. (1 cr; SP–Honors Arth major; # A-F only) Completion of research paper begun in a Xxxx course.

Arth 3971W. Major Project. (1 cr; SP–Artth major; # A-F only) Completion of research paper begun in a Xxxx course.

Arth 3975. Directed Museum Experience. (1-2 cr; SP–#; S-N only) Internship or docentship in an approved program in an art institution or museum. Open to both majors and nonmajors. Must consult with director of undergraduate studies.

Arth 3993. Directed Study. (1-4 cr [max 12 cr]; SP–#; A-F only)

Arth 3994. Directed Research. (1-4 cr [max 12 cr]; SP–#; A-F only)

Arth 5103. Hellenistic and Early Roman Art and Architecture. (3 cr; SP–Artht 3008, Jr or Sr or grad, or #) Sculpture, architecture, painting, and topography in developing centers of Hellenistic culture in the eastern Mediterranean, and in Etruscan and Roman towns from 400 B.C. to the beginnings of the Roman Empire.

Arth 5108. Greek Architecture. (3 cr; SP–Artht/Clas 3008, Jr or Sr or grad, or #) Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Italy, Asia Minor, and, Italy.

Arth 5111. Prehistoric Art and Archaeology of Greece. (3 cr; SP–Jr or Sr or grad student, Greek art/archaeology course or #) Artistic and architectural forms of Neolithic period in Aegean area and Cycladic, Minoan, and Mycenaean cultures. Aims and methods of modern field archaeology; the record of human habitation in the Aegean area. Archaeological evidence as a basis for historical reconstruction.

Arth 5112. Archaic and Classical Greek Art. (3 cr; SP–Jr or Sr or grad or #) Sculpture, painting, architecture, and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture; archaeological problems such as identifying and dating buildings; analysis of methods and techniques.

Arth 5120. Field Research in Archaeology. (3 cr; SP–#) Field excavation, survey, and research at archaeological sites and museum techniques of excavation and exploration; interpretation of archaeological materials.

Arth 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr; SP–Intro art history course or #) The architecture, painting, and sculpture of urban houses, country estates, and tombs in the Roman World. Relationships between public and private spheres, and literary and physical evidence; usefulness of physical evidence in illuminating gender roles.

Arth 5182. Art and the State: Public Art in the Roman Empire. (3 cr; SP–Intro art history course or #) Origins of Roman public art; use in maintaining community; exploitation by the first Emperor, Augustus; development and diffusion through the later Empire; varying capacities to adjust to the demands of a Christian Empire.

Arth 5234. Gothic Sculpture. (3 cr; SP–Jr or Sr or grad or #) The origin, character, and development of Gothic sculpture in France, the German empire, and the Netherlands, 1150-1440. Emphasis on French sculpture of the cathedral age and the emergence of a court style in Paris and elsewhere in Europe (e.g., London, Prague).

Arth 5352. History of Early Christian Art in Context. (3-4 cr; SP–Artth course or #) The role played by art in the formation of early Christian and Byzantine communities, and in establishing their relationships with the Pagan world and early Islam.

Arth 5323. Art of the Italian Renaissance: 14th-16th Centuries. (3 cr) Chronological/Thematically divided study of painting, sculpture, and architecture. Emphasizes major artists/commissions, but lesser schools/followers also considered.

Arth 5324. 15th-Century Painting in Northern Europe. (3 cr; SP–Jr or Sr or grad or #) The origin, character, and development of painting in France, the Netherlands area, and the German Empire during the years 1350 to 1500. Emphasis on the Flemish school (e.g., Van Eyck brothers, Campin, Van der Weyden) and its influence.

Arth 5346. 17th and 18th-Century Art of Southern Europe. (3 cr; SP–3011 or grad or #) 17th-century painting in Spain (e.g., Ribera, Velazquez, Murillo); 17th- and 18th-century architecture, sculpture, and painting in Italy (e.g., Caravaggio, Carracci, Bernini, Alighieri, Borromini, Piranesi).

Arth 5347. 17th and 18th-Century Art of Northern Europe. (3 cr; SP–3011 or grad student or #) Seventeenth-century painting in Holland/Belgium (e.g., Rembrandt, Rubens). Seventeenth- and eighteenth-century French architecture, sculpture, and painting (e.g., Versailles, Poussin, Watteau).

Arth 5417. Twentieth Century Theory and Criticism. (3 cr; SP–3464 or #) Trends in 20th-century art theory, historical methodology, and criticism. Key philosophical ideas of modernism/postmodernism: formalism, semiotics, poststructuralism, feminism, Marxism, psychoanalysis, deconstruction.

Arth 5431. Age of Revolution: French Painting 1789 to 1870. (3 cr) Major issues and movements in France and leading practitioners: neo-classicism-David; romanticism-Corot, Gericault, Delacroix; landscape and peasant painting—the Barbizon group; realism-Courbet; pre-impressionism-Monet, Manet, Pissaro. Movements linked with historical changes emphasizing contextualization of monuments.


Arth 5463. Early 20th-Century Painting and Sculpture. (3 cr) Primary movements of early 20th century: fauvism, German expressionism, futurism, dadaism, surrealism, non-objective painting, constructivism, Orphism, early abstraction. Framed against postimpressionism and internationalism at turn of century.


Arth 5521. Modernism and Modernity in American Art. (3 cr; A-F only) Examination of the art and architecture from the late 19th century to the modern era that illustrate the development of Chinese landscape painting and associated literati traditions.

Arth 5671. Japanese Painting. (3 cr) Major works from the late bronze age to the modern era that will be considered.

Arth 5673. Formation of Indian Art: 2500 B.C.E. to 300 C.E. (3 cr; SP–Art history course or #) Sculpture and architecture from the Indus Valley civilization through the Kushana period.

Arth 5776. Redefining Traditions: Indian Art to 1300. (3 cr; SP–Art history course or #) An examination of India's art and architecture from the time of the earliest free-standing temples through the 13th century, focusing on temples and their associated sculpture, mural painting, and the beginnings of Islamic architecture in India.

Arth 5777. The Diversity of Traditions: Indian Art to Present. (3 cr; SP–Art history course or #) Issues presented by sculpture, architecture and painting in India from the prehistoric Indus Valley civilization to the present day.

Arth 5781. Art of Empire: The Mughals, Safavids, and Ottomans. (3 cr) Artistic developments under the three most powerful Islamic empires of the 16th through 19th centuries: Ottomans of Turkey; Safavids of Iran; Mughals of India. Roles of religion and state will be considered to understand their artistic production.

Arth 5785. Art of Islamic Iran. (3 cr) Architecture, painting, and related arts in Iran from the inception of Islam (7th century) through the 20th century. Understanding the nature of Islam in Persian cultural settings and how artistic production here compares to the Islamic world.

Arth 5925. History of Photography as Art. (3 cr) Origins and development of photography, with attention to technology and cultural impact. Major aesthetic achievements in photography from its beginning to present.

Arth 5927. Documentary Cinema. (4 cr; A-F only) History of nonfiction filmmaking, from early forms of reportage and birth of documentary to emergence of “film-vertic” and “guerrilla television” and work by independents (e.g.: Terro Miro, Michael Moore).
A-F only) CLA], #; SP–[Upper div honors student in IT or CLA], #)

Seminar.

methods, mapping problems onto computational
Introduction to using computer programs to solve
observed properties of galaxies.

Ast 4101. Computational Methods in the Physical
White dwarfs, neutron stars, black holes. Formation of
atmospheres and interiors. Evolution of single stars,

planets, sun, stars, galaxies. Background and fragility
of life on Earth. Scale, origin, history of universe and
our relationship to it. Honors version of Ast 1001.

Ast 1011H. Exploring the Universe, Honors. (4 cr; 
QP–§1011, §1031, §1052: high school trigonometry, high
school physics or chemistry, SP–§1001, high school
trigonometry, high school physics or chemistry)
The human place in the universe. Study of other
planets, sun, stars, galaxies. Background and fragility
of life on Earth. Scale, origin, history of universe and
our relationship to it. Honors version of Ast 1001.

Ast 1019. Our Changing Planet. (4 cr; QP–§Geo 1019, §EEB 1019, SP–§Geo 2019, §EEB 1019)
Interdisciplinary study of Earth as a set of interacting,
evolving systems—solid Earth, oceans, atmosphere,
and biosphere—and its relationship with the sun and
stars. Cycling of matter and energy in Earth systems,
their equilibria, and the effect of natural and human
perturbations.

Ast 2001. Introduction to Astrophysics. (4 cr; QP–1 yr
calculus. Physics 1253, #; SP–1 yr calculus, Phys 2002 or #)
Physical principles and study of solar system, stars,
galaxy, universe. How observations and conclusions
are made.

Ast 2990. Directed Studies. (1-5 cr; QP–3051, #
SP–2001, Phys 2601 or #)
Independent, directed study in observational and
teoretical astrophysics. Arranged with faculty member.

Ast 4990. Directed Studies. (1-5 cr; QP–3051, #
SP–2001, #)
Independent, directed study in observational and
theoretical astrophysics. Arranged with faculty member.

Ast 4994W. Directed Research. (3-5 cr; QP–# SP–#)
Independent research in observational or theoretical
astrophysics. Senior Thesis for undergraduate
astrophysics majors may be arranged with faculty member.

Ast 5012. The Interstellar Medium. (4 cr; QP–3051, Phys
3513 or # SP–2001, Phys 2601 or #)
Survey of physical processes in the interstellar
medium. Dynamic processes, excitation processes,
emission and absorption by gas and dust. Hot bubbles,
HI regions, molecular clouds.

(4 cr; QP–3051, Phys 3513 or # SP–Phys 2601, #)
Large-scale structure and history of the universe.
Introduction to Newtonian and relativistic world
undergraduates who desire an introduction to
biochemistry including students in health science
programs such as dental hygiene or occupational
therapy.

Bio 1001. Elementary Biochemistry. (3 cr; QP–High
school chem or SP–High school chem or college
general chem)
Chemistry and biochemistry as they apply to the
organization, function, and regulation of living
systems, especially humans. Suitable for
undergraduate students in the sciences health science
programs such as dental hygiene or occupational
therapy.

Bio 2001. Biochemistry for the Agricultural and
Health Sciences. (3 cr; QP–Chem 1001 or 1 qtr of college
chemistry; SP–§BioC 1012; 3021; Chem 1001, Biol 1009; not
for biology majors) Survey of organic chemistry/biochemistry outlining
structure/metabolism of biomolecules, metabolic
regulation, and principles of molecular biology.

Bio 2031. Biochemistry. (3 cr; QP–Bio 1009 or 1202, 8 cr organic chemistry; SP–§Bio 3021; Biol 1002 or 1009,
Chem 2301)
Fundamentals of biochemistry including the structure
and function of proteins, nucleic acids, lipids and
carbohydrates; metabolism and regulation of
metabolism; quantitative treatments of chemical
equilibria, enzyme catalysis and bioenergetics; the
chemical basis of genetic information flow.

Bio 2980. Research Topics in Biochemistry. (1 cr [max
2 cr]; QP–#; SP–#)
Lectures, discussion on current research in the
department.

(3 cr; QP–General chem. organic chem or # SP–[General
chem, organic chem])
Chemical properties, biosynthesis, catalysis,
structure/function of biomolecules. Fundamental
aspects of molecular biology/metabolic regulation.

Bio 4002. Physiological Biochemistry of Human
Systems. (2 cr; QP–3300 or # SP–4001 or #)
Physiological biochemistry. Emphasizes processes
occurring in humans.

Astronomy (Ast)
Department of Astronomy
Institute of Technology

Ast 1001. Exploring the Universe. (4 cr; QP–§1011, §1012, §1031, §1032; SP–§1011)
The human place in the Universe. Study of Earth,
other planets, sun, stars, galaxies. Background and fragility
of life on Earth. Scale, origin, history of universe and
our relationship to it.

Ast 1004. Mathematics and Our Universe. (3 cr)
Selected topics in astronomy. Introduction to how
basic mathematical concepts and reasoning further our
understanding of the universe.

Ast 1011H. Exploring the Universe, Honors. (4 cr; 
QP–§1011, §1031, §1052: high school trigonometry, high
school physics or chemistry, SP–§1001, high school
trigonometry, high school physics or chemistry)
Biol 3522. Physical Biochemistry: Spectroscopy. (4 cr; QP–§MdBc/Chem 5528; intro physical chemistry or equiv required, intro biochemistry desirable; SP–§MdBc 5527; intro physical chemistry or equiv, intro biochemistry desirable) Application of thermodynamics and statistical thermodynamics to solution behavior, binding, and helix-coil transitions of proteins and nucleic acids. Use of spectroscopy to elucidate enzyme mechanisms. Hydrodynamic, scattering, and crystallographic approaches to biopolymer structure.

Biol 3530. Selected Topics in Molecular Biophysics. (1-3 cr [max 9 cr] QP–§Chem 5530; §MdBc 5530; §MdBc 5525 or §MdBc 5528 or Chem 5525 or 5526 or 5527 or 5528 or equiv; SP–§5527 or §5528 or equiv) Topics in current literature on biophysics of proteins, nucleic acids, muscle, membranes. Content/instructors vary from one offering to another, on an approximately every other year rotation.

Biol 3531. Macromolecular Crystallography I: Fundamentals and Techniques. (1 cr; QP–§[One organic chemistry or biochemistry course, [two calculus or college physics courses]] or §SP–[One organic chemistry or biochemistry course, [two calculus or college physics courses]] or §S–N only) Macromolecular crystallography for protein structure determination/engineering. Determining macromolecule structure by diffraction.

Biol 3532. Macromolecular Crystallography II: Techniques and Applications. (1 cr; QP–§5531; §5531; §S–N only) Determining structure of macromolecule by diffraction. Using software in macromolecular crystallography.

Biol 3561. Microbial Genomics. (3 cr; SP–College-level courses in [organic chemistry, biochemistry, microbiology]) Introduction to genomics. Emphasizes microbial genomics. Sequencing methods, sequence analysis, genomics databases, genome mapping, prokaryotic horizontal gene transfer, genomics in biotechnology, intellectual property issues.

Biol 5401W. Advanced Metabolism and Its Regulation. (3 cr; QP–3021 or 5331; §P–3021 or 4331 or Biol 3021) Underlying principles that determine metabolism of common/unusual compounds in plants, animals, microorganisms. Regulation of carbon, energy flow in whole organisms.

Biol 5444. Muscle. (3 cr; QP–3021 or 5331 or Phsl 3052 or §SP–§Phsl 5444; Biol/BioC 3021 or BioC 4331 or Phsl 3061 or §M) Muscle structure/function: molecular mechanism by which force is generated.

Biol 5464. Membrane Biochemistry. (2 cr; QP–3021 or 5331 or §SP–3021 or 4331 or Biol 3021 or §M) Membrane structure. Mechanisms and physiological roles of channels, pumps, and membrane enzymes.

Biol 5527. Physical Biochemistry: Biopolymer Structure, Energetics, and Dynamics. (4 cr; QP–§MdBc/Chem 5527; intro physical chemistry or equiv required, intro biochemistry desirable; SP–§MdBc 5527; intro physical chemistry or equiv, intro biochemistry desirable) Application of thermodynamics and statistical thermodynamics to solution behavior, binding, and helix-coil transitions of proteins and nucleic acids. Use of spectroscopy to elucidate enzyme mechanisms. Hydrodynamic, scattering, and crystallographic approaches to biopolymer structure.

Biol 5528. Biochemistry: Spectroscopy. (4 cr; QP–§MdBc/Chem 5528; intro physical chemistry or equiv required, intro biochemistry desirable; SP–§MdBc 5528; intro physical chemistry or equiv required, intro biochemistry desirable) Application of NMR, electron spin resonance, optical, infrared, and circular dichroism spectrosocopies to proteins, nucleic acids, and membranes.

Biol 5530. Selected Topics in Molecular Biophysics. (1-3 cr [max 9 cr] QP–§Chem 5530; §MdBc 5530; §MdBc 5525 or §MdBc 5528 or Chem 5525 or 5526 or 5527 or 5528 or equiv; SP–§5527 or §5528 or equiv) Topics in current literature on biophysics of proteins, nucleic acids, muscle, membranes. Content/instructors vary from one offering to another, on an approximately every other year rotation.

Biol 5531. Macromolecular Crystallography I: Fundamentals and Techniques. (1 cr; QP–§[One organic chemistry or biochemistry course, [two calculus or college physics courses]] or §SP–[One organic chemistry or biochemistry course, [two calculus or college physics courses]] or §S–N only) Macromolecular crystallography for protein structure determination/engineering. Determining macromolecule structure by diffraction.

Biol 5532. Macromolecular Crystallography II: Techniques and Applications. (1 cr; QP–§5531; §5531; §S–N only) Determining structure of macromolecule by diffraction. Using software in macromolecular crystallography.

Biol 1002W. Introductory Biology II: Molecular, Cellular, and Developmental Perspectives. (5 cr; QP–[1021 or equiv, Chem 1051, SP–1001 or equiv], Chem 2021; A-F only) Chemistry of living things, cell structure/transport, energy processing in cells, introduction to primary metabolism, genetic, evolutionary, and ecological perspectives on issues concerning human diversity; population dynamics, health, agriculture, and conservation. Lab.

Biol 3105. Neurobiology Laboratory I. (1.5 cr; QP–NSc 3105, §Phsl 3105) Principles of neuroanatomy and tissue repair studied using neural tissue and various models of nervous system plasticity and neurodegenerative processes. Methods are used for studying neural plasticity in disease models and biological systems. A-F only.

Biol 3115. Neurobiology Laboratory II. (1.5 cr; QP–NSc 3115, §Phsl 3115 or Phsl 3102 or §Phsl 3102 or §Phsl 3102W; A-F only) Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence.

Biol 3211. Animal Physiology. (3 cr; QP–[1009 or 1201], Chem 1052; SP–[1001 or 1009], Chem 1021; 92005 strongly recommended.) Compares ways different animals solve similar physiological problems.

Biol 3301. Biology of Microorganisms. (5 cr; QP–[§McIB 3103, §VPb 3103, §PB 3103, §1001 or 3001 or BioC 3021 or BioC 3101 or BioC 3531 or BioC 3532 or BioC 3533 or §1002 or Chem 2302] or [1009, [2001 or BioC 3021 or 3201 or 3621 or BioC 2021]; A-F only) Taxonomy, anatomy, physiology, biochemistry, pathogenesis, immunology, ecology of microbes. Molecular structure in relation to bacterial function and disease. Includes lab.

Biol 3407. Ecology. (3 cr; QP–[1009 or 1201 or equiv], [Math 1142 or Math 1251 or equiv] SP–§3807; [1001 or 1009 or equiv], [Math 1142 or Math 1271 or equiv]) Principles of population growth/interactions and ecosystem function applied to ecological issues. Regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, biodiversity. Lab, field work.

Biol 3811. Introduction to Animal Behavior. (3 cr; QP–[1009 or 1202 or 1201 or §3411; 1002 or 1009 or #]; A-F only) Principles of animal behavior. Mechanism development, function, and evolution. Emphasizes evolution of adaptive behavior, social behavior in the natural environment. Lab, field work.

Biol 3960. Honors Seminar I. (2 cr; max 2 cr) QP–Limited to participation in CBS honors program, §SP–Limited to participation in CBS honors program, §; S-N only) Oral reports on topics of current interest to biologists. Progress reports on laboratory and field research by students.

Biol 3960H. Honors Seminar II. (2 cr; max 2 cr) QP–Limited to participation in CBS honors program, §SP–Limited to participation in CBS honors program, §; S-N only) Oral reports on topics of current interest to biologists. Progress reports on laboratory and field research by students.

Biol 4003. Genetics. (3 cr; QP–BioC 3021 or 5331; BioI/BioC 3021 or BioC 4331) Introduction to the principles of genetic information, its transmission from parents to offspring, its expression in cells and organisms, and its course in populations.


Biol 4125. Recombinant DNA Laboratory, (3 cr; QP–§5825, §MiB 5452; BioC 3021 or 5003; S-P §4185; [2001 or BioC 3021 or 4003], [MiB 3001 or GCB 4025, BioC 4025, GCB 4015]; A-F only) Basic recombinant DNA techniques: methods for growing, isolating, and purifying recombinant DNA vectors and cloning vectors. DNA sequencing and sequence analysis. Genetic engineering, Polymerase Chain Reaction (PCR), Southern and Western blotting, and other current techniques.

Biol 4185. Recombinant DNA Laboratory. (3 cr; QP–[Biochemistry or genetics course], [intermediate-level lab in biochemistry or genetics or cell biology or microbiology]; enrollment in Summer Undergraduate Research Program in Life Sciences; SP–§4125; [biochemistry or genetics course], [intermediate-level lab in biochemistry or genetics or cell biology or microbiology]; enrollment in Summer Undergraduate Research Program in Life Sciences; A-F only) Basic recombinant DNA techniques. Methods for growing, isolating, and purifying recombinant DNA vectors and cloning vectors. DNA sequencing and sequence analysis.

Biol 4501. Social Uses of Biology. (3 cr; QP–[10 cr in sciences; SP–7 cr in sciences]) Influence of biological science on the quality of human life: agriculture, medicine, occupational health, environmental science, and the development of human nature. Responsibilities and roles of biologists in policy formulation in the scientific and political world.

Biol 4580. Special Topics in Biology. (1-7 cr; max 7 cr; QP–#; §A–P#) Field investigation of selected areas of research at Itasca Field Station.

Biol 4948. Directed Research at Itasca. (1-7 cr; max 7 cr; SP–#; max of 7 cr of [4948 or 4993 or 4994]) May count toward major requirements; S-N only)

Biol 4950. Special Topics in Biology. (1-5 cr; max 10 cr) In-depth study of a specialized topic in the life sciences.

Biol 5407. Ecology. (3 cr; QP–§3407; [1009 or 1201 or equiv], [Math 1142 or Math 1271 or equiv], [grad or #]; SP–§3407; [1001 or 1009 or equiv], [Math 1142 or Math 1271 or equiv], [grad or #]) Principles of population growth/interactions and ecosystem function applied to ecological issues, including regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, and biodiversity. Lab.

Biol 5409. Evolution. (3 cr; QP–§3409; [1009 or 1202], [grad or #]; SP–§3409; [1001 or 1009], [grad or #]) Diversity of forms in fossil record and in presently existing biology. Genetic mechanisms of evolution. Examples of ongoing evolution in wild/domesticated population and in domesticated disease-causing organisms. Lab.

Biol 5501. Biological Collections: Curation and Management. (11 cr; QP–[1103 or 1106 or 3011 or 3012; SP–2012 or 2002 or 3007 or 3211]) Roles and values of biological collections in terms of biodiversity; natural history museum management and philosophy; conservation of museum specimens; data access and ethics. Students participate in various curatorial activities.

Biol 5511. Teaching the Biological Sciences. (3 cr; QP–9 cr in the life sciences; SP–6 cr in the life sciences; A-F only) Methods and teaching styles used by outstanding university teachers including reviews and critiques from research on teaching. Opportunities for students to practice and evaluate teaching strategies.

Biol 5910. Special Topics in Biology for Teachers. (1-4 cr; max 12 cr) QP–[Science or science education or elementary education or K-12 licensed teacher; SP–BA or BS in science or science education or elementary education or K-12 licensed teacher] Courses developed for K-12 teachers depending on topics or subtopics which might include any of the following: plant biology, animal biology, genetics, cell biology, biochemistry, microbiology.

Biol 5913. Biology for Teachers: Monarchs in the Classroom. (3 cr; QP–[Elementary or middle school or high school or preservice teacher or #; application]) Two-week summer workshop. Week one focuses on monarch butterfly biology taught through fieldwork, labs, lecture, and research projects. A 2- to 3-week break follows, when students raise monarchs, conduct simple experiments. Week two focuses on designing classroom activities/projects based on monarch biology. Follow-up meetings held during academic year.
BMEn 5041. Tissue Engineering. (3 cr; SP–IT upper div or grad student or #) Fundamentals of wound healing and tissue repair; characteristics of cell-matrix interactions; case study of engineered tissues, including skin, bone marrow, liver, vessel, and cartilage; regulation of biomaterials and engineered tissues.

BMEn 5101. Bioelectric Measurements and Therapeutic Devices I. (3 cr; SP–Phl 3440, calculus, college physics, #) Instrumentation, computer systems, and processing requirements for clinical physiological signals. Electrode characteristics, signal processing, and interpretation of physiological events by ECG, EEG, and EMG. Measurement of respiration and blood volume and flow.

BMEn 5102. Bioelectric Measurements and Therapeutic Devices II. (3 cr; SP–5101) Theory and application of electrical stimulation in areas of therapeutic and functional neuromuscular stimulation and pain control, cardiac pacing, defibrillation, tissue healing, and electrotherapy. Safety of electric fields. Electrical tissue impedance measurements.


BMEn 5201. Musculoskeletal Biomechanics. (3-4 cr; SP–IT upper div or grad student, AEM [statics, principles, basic electromagnetic theory; A-F only]) Introduction to the biomechanics of musculoskeletal systems. Description of anatomy and tissue material properties. Kinematics, dynamics, and control of joints and limb movement. Analysis of forces and motions within joints. Application to injury, disease, and treatment of specific joints, design of orthopedic devices, and implants.

BMEn 5310. Biological Transport Processes. (3-4 cr; SP–IT upper div or grad student or # Chn 5103 or ME 5342 recommended; A-F only) Introduction to biological fluid, mass, and heat transport. Mass transfer across membranes; fluid flow in vessels and interstitium; heat transfer in cells, tissues, and body. Applications to blood oxygenation, respiration, drug delivery, and tissue engineering.

BMEn 5350. Cell Engineering. (3 cr; SP–Cell biol or equiv; SP–5381 or equiv, 5310 or equiv, 5201 or equiv, IT upper div or grad student or #) Survey of engineering approaches to cell-related phenomena important to cell and tissue engineering: recellularization or reprogramming, trafficking and signaling processes; applications to cell proliferation, adhesion, and motility; cell-matrix interactions.

BMEn 5371. Biomedical Applications of Heat Transfer in Humans. (3-4 cr; SP–Phl 3053, Phl 3056, Phl 5441; SP–Phl 3053, Phl 3056, Phl 5441) Overview of physiology underlying thermoregulation in humans, clinical applications of heat transfer in humans, and a framework for a design project.


BMEn 5502. Pathobiology of Medical Devices. (3 cr; SP–IT upper division or grad student; SP–IT upper division or grad student; A-F only) Biological response to biomaterials presented in context of fundamental principles of cell injury, adaptation, repair, or death. Diversity of medical uses of biomaterials, by organ system. Unique features of specific biomedical systems in which medical devices are used.

BMEn 5910. Special Topics in Biomedical Engineering. (1-4 cr) Special topics.

BMEn 5920. Special Topics in Biomedical Engineering. (2-4 cr) Special topics.

Biosystems and Agricultural Engineering (BAE)

Department of Biosystems and Agricultural Engineering Institute of Technology

BAE 1011. Biosystems and Agricultural Engineering Orientation. (1 cr; S-N only) Introduction to biosystems and agricultural engineering profession through readings and discussions of biosystems, engineering, and students; curriculum and intern, undergraduate research, and honors opportunities. Ethics, safety, environmental issues.


BAE 3013. Engineering Principles of Molecular and Cellular Processes. (3 cr; SP–Bio 1009; SP–Bio 1009; A-F only) Applied engineering principles in biological processes. Classification of microbes and industrial importance, parameters for cellular control, modeling of cell growth/metabolism, enzymatic catalysis, bioreactor design, product recovery operations design, case studies.

BAE 3023. Engineering Principles of Soil-Water-Plant Processes. (3 cr; SP–IT, 3031, [AEM 3200 or CE 3400]; Bio 1009; SP–Bio 1009, [CE 3502 or ECE 3502]) Physical, thermal, texture, strength, and moisture properties of soil. Soil-water-plant interactions; clayey soils. Movement; energy/water balances in soil-plant systems. Plant stresses from drought, flooding, temperature, radiation, compaction, pollution. Engineering management to impact on soil-water systems.

BAE 3093. Directed Studies. (1-5 cr; SP–AEM; A-F only) Independent study of topic(s) involving physical sciences as applied to agricultural and food industries.

BAE 4013. Transport in Biological Systems. (3 cr; SP–IT, 3150, CE 3400, ME 3532; SP–3013, CE 3502, ME 3324, upper div IT; A-F only) Application of thermodynamics, fluid flow, heat/mass transport to design problems involving biological processes and materials at cellular organism, and system level. Agricultural, environmental, food, and bioprocess applications.

BAE 4023. Instrumentation and Control for Biological Systems. (3 cr; SP–EE 1400, EE 3009, ME 3900 or Stat 3091; SP–EE 3005 or EEE 3005, Stat 3201, upper div IT) Measurement of position, force, pressure, flow, temperature, size, shape, color, texture, rheology, moisture, water mobility, fat, and pH. Linking physical and biological control systems.

BAE 4112W. Senior Design I. (2 cr; SP–Upper div IT; upper IT & grad completed or in progress; SP–IT, SP–IT, A-F only) Review of design concepts and process. Case studies involving engineering design. Discussion of safety/ethical issues. Student proposals for senior design project (individual or group) to be completed in 4122. Oral presentation of written proposal.

BAE 4122W. Senior Design II. (2 cr; SP–Q: 5891; SP–4112; A-F only) Complete design project started in 4112. Report, poster, and oral presentation of final design.

BAE 4313. Design of Machine Systems. (3 cr; QP–AEM 3016, AEM 3036; SP–AEM 2121, AEM 3031, upper div IT) Case studies of machines/processes. Design for world markets; crop production (tractors, harvesters, implements); food- and crop-processing systems (pumping, conveying); animal systems (milking parlors, design, waste-handling machines).


BAE 4523. Water Management Engineering. (3 cr; SP–3052 or CE 3300, CE 3400, upper div IT or grad in IT major; SP–3023 or CE 3301, CE 3502, upper div IT; A-F only) Applying engineering principles to management of water for production and environmental protection in agricultural systems. Designing facilities to irrigate/ drain croplands and enhance water quality.

BAE 4533. Agricultural Waste Management Engineering. (3 cr; SP–Upper div IT or grad, 3052; SP–3023, upper div IT) Sources and characteristics of agricultural wastes, including livestock, food processing, and domestic wastes. Physical, biological, chemical, rheological, and microbiological properties. Effects on environment. Collection, storage, treatment (aerobic and anaerobic), and use/disposal. Land application.

BAE 4713. Bioprocess Engineering. (3 cr; SP–3150; SP–3011, upper div IT, IT, A-F only) Separation and fermentation as applied to biological systems; product recovery in bioproduct technology; topics in bioremediation; modeling of separation processes in biological systems.

BAE 4723. Food Process Engineering. (3 cr; SP–Upper div IT or grad in IT major, Chn 5103 or ME 5342; SP–CE 3502, ME 3324, upper div IT) Application of principles of heat transfer and fluid flow to design of food processing operations such as thermal and aseptic processing, freezing, pumping, drying, evaporation, and extrusion. Marketing, government regulation, nutrition issues.

BAE 4900. Intern Reports. (2 cr; Max 4 cr) SP–IT or COAFES student in BAE, SP–# or IT, COAFES student in BAE, SP–# only) Reports on intern work assignments reviewed by faculty and industry advisers.

BAE 5095. Special Problems. (1-5 cr; SP–#) Advanced individual-study project. Application of engineering principles to specific problems.

BAE 5513. Watershed Engineering. (3 cr; SP–Upper div IT or grad, 3052 or CE 3300, CE 3400, SP–2023, upper div IT) Application of engineering principles to managing surface runoff from agricultural, range, and urban watersheds. Design of facilities and selection of land use practices for controlling surface runoff to mitigate problems of flooding and degradation of surface-water quality.

Business Administration (BA)

Curtis L. Carlson School of Management

BA 1001. Introduction to Information Technology. (1 cr; S-N only) Assess computing skills. Identify resources to develop skills in word processing, spreadsheets, presentation software, e-mail, LUMINA, remote access, and Web. Self-paced.

BA 1910W. Freshman Seminar, Writing Intensive. (2 cr; Max 6 cr; A-F only) Self-paced.

BA 1998. Independent Study. (1-4 cr; Max 8 cr) SP–[CSOM fr or soph], SP–[CSOM fr or soph]
Course Descriptions

BA 3033W. Business Communication. (4 cr; QR–Fr
composition, CSOM; SP–Fr composition, CSOM upper-
div; A-F only)
Written/oral communications skills for effective
participation in contemporary organizations.
From basic principles to communication strategy.
Communication technology. Cases, simulations of
“real-world” situations.

BA 3101W. Global Seminar: Supplemental Writing. 
(1 cr [max 1 cr] SP–$3100; S-N only)
Projects developed by instructor of Global Seminar.
Students analyze/rewrite intercultural experience of
studying abroad. Individualized feedback/coaching in
writing skills. Taught during intersession. Writing
intensive, if concurrently enrolled in 3100.

BA 3990H. Honors Topics. (2 cr; A-F only)
Offered in conjunction with Minnesota Mutual
Foundation leadership perspectives program.

BA 3998. Independent Study. (1-4 cr; SP–CSOM upper
div; A-F only)
Student-initiated project or independent study.

BA 3999. Independent Study: Internship. (1-4 cr; max
8 cr; SP–CSOM upper div; A-F only)
Faculty supervised independent/directed study
associated with internship or with formal work
experience.

Business and Industry Education (BIE)

Department of Work, Community, and Family
Education

College of Education and Human Development

BIE 1201. Introduction to Vocational and Technical
Teaching. (2 cr; A-F only)
Techniques for the occupationally certifiable
individual who plans to enter the field of vocational
teaching. Required for initial state vocational
licensure.

BIE 1396. Supervised Vocational-Technical Teaching. 
(2 cr; S-N only)
Supervised teaching for beginning teachers, or
teaching activities for preservice teachers.

BIE 3061. Professional Sales Management. (3 cr; 
A-F only)
Examination of the sales manager’s role in training
and mentoring sales representatives in strategic
selling, customer-oriented service, and problem-
solving tactics. Includes recruitment, hiring, training,
and retention of a sales force.

BIE 3111. Exploring Technology Systems. (3 cr)
Communication, information, construction,
manufacturing, design, technical drawing,
biotechnology, energy, power, and transportation
technologies. Students develop problem solving and
manipulative skills as well as understanding of the
principles and processes through hands-on activities in
a multiple activity laboratory.

BIE 3112. Technical Drawing and Production
Technologies. (3 cr; A-F only)
Instruction and laboratory experiences in technical
drawing and design technologies; production
technologies related to construction and
manufacturing. Students will develop manipulative
skills and techniques and an understanding of
principles and processes of the technologies through
hands-on work and lab activities.

BIE 3113. Manufacturing Technology. (3 cr; SP–$3111)
Study of manufacturing concepts, principles, and
applications; automated manufacturing, including
computer integrated manufacturing and robotics;
design, operation, and management of manufacturing
systems and products; lab.

BIE 3114. Construction Technology. (3 cr; SP–$3111)
Introduction to principles, concepts and techniques
involved in civil, commercial, and residential
construction. Laboratory experiences in planning,
designing, organizing, producing, and testing
structures.
Course Descriptions

BIE 5624. Sales Training. (3 cr; A-F only)
Training competent customer service employees as part of a marketing strategy. Explore training strategies using the appropriate instructional methods for different settings and situations.

BIE 5625. Technical Skills Training. (3 cr)
Analyze technical skills and training practices in business and industry; systems and process analysis; troubleshooting of work behavior; design methods and developing training materials.

BIE 5626. Customer Service Training. (3 cr; A-F only)
Overview of customer service strategies used by successful organizations and training practices used to develop customer-oriented personnel.

BIE 5627. Management and Supervisory Development. (3 cr)
Problems, practices, programs, and methodologies relating to the training and development of managers and supervisors, including needed competencies, needs assessment, delivery modes, and evaluation.

BIE 5628. Multimedia Presentations in Business. (3 cr; SP–5011 or equiv)
Designing, creating, and presenting information using multimedia resources in business settings.

BIE 5629. Course Development for Business and Industry. (2 cr; A-F only)
Identify course outcomes, sequencing, planning lessons, methods, and media for instruction, evaluation, and feedback.

BIE 5661. Instructional Methods for Business and Industry Education. (2 cr)
Basic instructional strategies and techniques in instructional settings, from schools and colleges to business and industry.

BIE 5662. Computer Training in School and Industry Settings. (3 cr; SP–5011 or equiv)
Alternative teaching practices for business applications software: word processors, spreadsheets, graphics, desktop publishing, databases, and communications; public school and industry settings.

BIE 5796. Field Based Projects in Business and Industry. (1-4 cr [max 4 cr]; S–N only)
Curricular, instructional, developmental, or evaluative problems and projects applicable to local school or business and industry situations.

BIE 5993. Directed Study in Business and Industry. (1-4 cr [max 4 cr])
In-depth individual inquiry in the content areas related to business and industry.

Business, Government, and Society (BGS)

Department of Strategic Management
Curtis L. Carlson School of Management

BGS 3002. Business and Society in the U.S. and World Economy. (4 cr; A-F)
Insights into ethical constraints and imperatives, stakeholder management and role of government regulations and the public policy process in domestic and global operations; technology and legal aspects; knowledge and skills to deal with the conflicts faced domestically and globally by managers.

BGS 3014. Topics in International Business, Government, and Society. (4 cr; A-F only)
Selected topics.

BGS 3040. Environment of the International Firm. (4 cr; SP–Mgmt 3001, CSOM upper-div major; A-F only)
Challenges, opportunities, and problems businesses face when operating outside their domestic environment. Competitive forces that have consequences for their performance/survival. Broad introduction to international economics, finance, and trade issues that affect multinational business decisions/operations.

BGS 4004. Managing the Multinational Business. (4 cr; SP–BA 3040; SP–BA 3040; A-F only)
Structures and strategies of the global business including issues such as personnel, technology, and operations in host nations. Introduction to the challenges unique to the management of the multinational firm that may involve topics such as comparative culture, trade, and ethics.

Business Law (BLaw)

Department of Accounting
Curtis L. Carlson School of Management

BLaw 3058. The Law of Contracts and Agency. (4 cr; SP–40 or more credits; SP–40 or more credits; A-F only)
Origin of law, its place in and effect on society; history and development of law; system of courts; legal procedure. Law of contracts as the basic law affecting business transaction. Laws affecting the sale of goods and contracts and the law of agency.

BLaw 5078. Partnerships and Corporations. (2 cr)
Partnership and corporate forms of business entities, including methods of creating the relationships and the study of law used to regulate and control these organizations and their members.

Cell Biology and Neuroanatomy (CBN)

Department of Cell Biology and Neuroanatomy
Medical School

CBN 1027. Human Anatomy for Kinesiology Students. (3 cr; A-F only)
Introduction to human anatomy. Emphasizes musculoskeletal anatomy germane to athletic training, biomechanics, exercise physiology, motor learning/development.

CBN 5058. Anatomy for Physical Therapy. (5 cr; SP–Regis physical therapy student; A-F only)
Lecture and lab dissection of bones, muscles, nerves, vessels, connective tissue, and selected internal organs plus joint structures of limbs, spinal column, head, and pelvis. Includes some histology and embryology. Correlation of all content to clinical conditions.

Center for Spirituality and Healing (CSpH)

Health Sciences

CSpH 5100. Introduction to Complementary Healing Practices. (3 cr)
Cultural contexts of healing traditions. Complementary therapies presented by practitioners, including traditional Chinese medicine, meditation, mind-body healing, spiritual practices, energy healing, naturopathy, herbalism, movement therapies, homoeopathy, manual therapies, and nutrition.

CSpH 5110. Ways of Thinking About Health. (2 cr)
Diverse healing traditions of selected cultures. Use of herbal medicines as essential component of social structure. Links between nature, humans, and indigenous healers. Use of foods as healing medicines in India, China, and ancient Greece. Connection between spirituality and healing powers in indigenous/modern cultures. Rise of scientific traditions, their influence on ways of thinking about healing.

Central Asian Studies (CAS)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

CAS 3511. Ancient Iran. (3 cr; SP–§MELC 3511)
Development of ancient Iranian culture under the Achaemenids and Sassanians; the impact of the Zoroastrian religion on Iranians and of Hellenoism on the east, especially on domains such as Bactria; Iran’s contribution to the flourishing cultures of the Silk Road.

CAS 3512. Modern Iran. (3 cr; SP–§MELC 3512)
The development of medieval Iranian culture under the Arab, Turkish, and Mongol rules. Study two major trends: Islamization beginning after the Arab conquest to A.D. 1500; westernization from the Safavids to the Islamic Republic in 1979.

CAS 3526. Islam and Communism. (3 cr; SP–§5526, §MELC 3526)
Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

CAS 3531. Central Asian Culture. (3 cr; SP–§MELC 3531)
Development of Central Asian cultures from the rise of the Turkish dynasties (c. 1000) to the present. Indo-European indigenous population displaced by the Arabs, Turks, Mongols, and the Soviets. Major themes: Islamization; Turkification; Westernization; and Sovietization.
CAS 3532. Russia and Central Asia. (3 cr; SP–§5532, §MELC 3532) Rise and fall of the Mongol Empire; formation of the Chaghatay Khanate and the Golden Horde; Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

CAS 3601. Fiction of Iran and Central Asia in Translation. (3 cr; SP–§5601, §MELC 3601) Social, political, and religious thought of Iranian (and Soviet) Central Asian writers of fiction since the early years of the 20th century; emphasizes themes of tradition, modernization (Westernization and Sovietization), women’s rights, and secularization.

CAS 3602. Persian Poetry in Translation. (3 cr; SP–§5602, §MELC 3602) Major poetic works of Iran in translation dealing with life at the medieval courts, Sufic poetry, and “new” poetry. Rudaki, Khayyam, Rumi, Hafiz, Yushij, and Farrukhzad are among the poets whose works are examined.

CAS 5311. Medieval Sages. (3 cr; SP–§MELC 5311; background in Iranian, Central Asian, or Islamic studies recommended) Study and discussion of the intellectual life of the region from the rise of the Ghaznavids (A.D. 1000) to the fall of the Timurids (A.D. 1500). Ibn Sina (Avicenna), al-Biruni, al-Ghazali, Rumi, Sadi, and Firdowsi are among the sages whose lives are examined.

CAS 5526. Islam and Communism. (3 cr; SP–§3526, §MELC 5526) Development of medieval Islamic culture in Transoxiana; the formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic and Communist doctrines; Pan-Islamism; Pan-Turkism.

CAS 5532. Russia and Central Asia. (3 cr; SP–§3532, §MELC 5532) Rise and fall of the Mongol Empire, formation of the Chaghatay Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

CAS 5601. Fiction of Iran and Central Asia in Translation. (3 cr; SP–§3601, §MELC 5601) Social, political, and religious thought of Iranian (and Soviet) Central Asian writers of fiction since the early years of the 20th century, emphasizing themes of tradition, modernization (Westernization and Sovietization), women’s rights, and secularization.

CAS 5602. Persian Poetry in Translation. (3 cr; SP–§5602, §MELC 5602) Major poetic works of Iran dealing with life at the medieval courts, Sufic poetry, and “new” poetry are studied. Rudaki, Khayyam, Rumi, Hafiz, Yushij, and Farrukhzad are among the poets whose works are examined.

CAS 5994. Directed Research. (1-10 cr; SP–#A, #Q) Chemical Engineering (ChEn) Department of Chemical Engineering and Materials Science Institute of Technology

ChEn 1001. Advances in Chemical Engineering. (1 cr; SP–Recommended for [chemical engineering, materials science/engineering] majors; S-N only) Survey of important advances in chemical engineering, materials science/engineering. Design problems, career opportunities. Lectures, demonstrations, interactive exercises.

ChEn 4001. Material and Energy Balances. (4 cr; QP–Math 3261, Phys 1253, Chem 3302, ChEn major; SP–Math 2243 or MATH 2243, Phys 1302, ChEn 2302 or ChEn 2302, ChEn major; A-F only) Description and analysis of chemical engineering systems: units and dimensions, materials balances on systems with and without chemical reactions, elementary phase equilibria and phase diagrams, energy balances. Numerical methods for typical chemical engineering problems.

ChEn 4002. Transport Phenomena. (4 cr; QP–ChEn 5001, ChEn 5101, upper div ChEn major; SP–ChEn 4001, upper div ChEn major; A-F only) Fluid statics and dynamics and their applications to chemical engineering systems, conduction, and diffusion.

ChEn 4003. Heat and Mass Transfer. (4 cr; QP–ChEn 5102, upper div ChEn major; SP–ChEn 4002, upper div ChEn major; A-F only) Principles and applications of heat and mass transfer in chemical engineering systems.

ChEn 4004. Separation Processes. (4 cr; QP–ChEn 5103, ChEn 5201; SP–ChEn 4003, ChEn 4101; A-F only) Introduction to unit operations and mass transfer operations used in separation processes.

ChEn 4101. Chemical Engineering Thermodynamics. (4 cr; QP–Chem 5534, ChEn 5101; SP–ChEn 4001 or ChEn 4001, Chem 5301; A-F only) Applications of concepts of thermodynamics and chemical equilibrium to problems in chemical engineering.

ChEn 4102. Reaction Kinetics and Reactor Engineering. (4 cr; QP–ChEn 5201, ChEn 5202; SP–ChEn 4001, ChEn 4101; A-F only) Chemical equilibrium and chemical kinetics applied to chemical engineering systems. Behavior and design of chemical reactors, interaction between chemical and physical rate processes. Mathematical modeling and design of reactors.

ChEn 4401W. Chemical Engineering Lab I. (3 cr; QP–ChEn 5101, ChEn 5102, ChEn 5201; SP–ChEn 4003, ChEn 4101; A-F only) Principles and techniques of efficient design, structure, measurement, planning, analysis, and presentation of experiments and experimental results. Problems in energy balances, fluid flow, heat transfer, and mass transfer. Design of new systems using experimental data obtained in lab. Oral and written presentations.

ChEn 4402W. Chemical Engineering Lab II. (3 cr; QP–ChEn 5401; SP–ChEn 4004) Principles and techniques of efficient design, structure, measurement, planning, analysis, and presentation of experiments and experimental results. Experimental problems in energy balances, fluid flow, heat transfer, and mass transfer. Design of new systems using data obtained in lab. Oral and written presentations.

ChEn 4501W. Chemical Engineering Process Design. (3 cr; QP–ChEn 5104, ChEn 5401, ChEn 5301; SP–ChEn 4003) Engineering economics of process evaluation, including time and bases for cost estimation. Engineering design through group projects. Case studies.

ChEn 4502W. Chemical Engineering Process Design II. (3 cr; QP–ChEn 5501; SP–ChEn 4004, ChEn 4501, A-F only) Continue review (from 4501) of unit processes of operations, introducing detail for design, cost analysis, control, operability, modifications, and alternatives. Case studies and special topics.

ChEn 4593. Directed Study. (1-4 cr; QP–#; SP–#) Directed study under faculty supervision.

ChEn 4594. Directed Research. (1-4 cr; QP–#; SP–#) Independent lab research under faculty supervision.

ChEn 4595. Special Topics. (1-4 cr; QP–#; SP–#) New or experimental special topics course.

ChEn 4601. Process Control. (3 cr; QP–ChEn 5301, ChEn 5104; SP–ChEn 4102, A-F only) Analysis of dynamic behavior and design of linear control systems for chemical processes. Dynamic response and stability of linear ODE systems, tuning of PID controllers, synthesis of feedback, feedforward/feedback controller.

ChEn 4604. Process Control Laboratory. (2 cr; QP–ChEn 5601; SP–ChEn 4601 or ChEn 4601; A-F only) Experiments designed to reinforce concepts and principles of process control taught in 4601. Introduce industrial-process instrumentation and control, and use of computers for data acquisition, analysis, and control.

ChEn 5103. Porous Media. (3 cr; QP–ChEn 5103, ChEn 5202; SP–Math 5219, ChEn 4003, ChEn 4102; A-F only) Geometry and topology of porous materials. Fundamentals of flow, transport, and deformation. One-phase and two-phase Darcy flows, convective dispersion in microporous materials. Relations of macroscopic properties and behavior to underlying microscopic structures and mechanisms. Nanoporous materials. Examples from nature and technology.

ChEn 5104. Coating Process Fundamentals. (3 cr; QP–ChEn 5103, ChEn 5202; SP–ChEn 4003, ChEn 4102; A-F only) Basic process functions: viscous flow and rheology, capillarity, wetting; electrorheological effects; phase change, colloidal transformations, mass/heat transfer in drying; kinetics in curing; stress and property development in solidification. Illustrations drawn from theoretical modeling, flow visualization, and stopped-process microscopy.

ChEn 5302. Chemical Reaction Engineering and Catalysis. (3 cr; QP–ChEn 5301; SP–ChEn 4102; A-F only) Continuous and batch reactors, heat management, catalytic reactions and reactors, nonideal flow in reactors, polymerization, multiphase reactors. Fundamentals and mechanisms of catalytic reactions. Industrial examples in petroleum/chemical industries.

ChEn 5751. Biochemical Engineering. (3 cr; QP–ChEn 5103, ChEn 5202; A-F only) Chemical engineering principles applied to analysis and design of complex cellular and enzyme processes. Quantitative framework for design of cells for production of proteins, synthesis of antibodies with mammalian cells, or degradation of toxic compounds in contaminated soil.

ChEn 5753. (Biological) Biomedical Transport Processes. (3 cr; QP–ChEn senior or #P–#M 5381, #BFH 4010; ChEn 4003) Introduction to fluid, mass, and heat transport in biological systems. Mass transfer across membranes, fluid flow in capillaries, interstitium, veins and arteries. Heat transfer in single cells and tissues. Whole organ and body heat transfer issues. Blood flow and oxygenation. Heat and mass transfer in respiratory system. Biotransport issues in artificial organs, membrane oxygenators, and drug delivery applications.

ChEn 5754. Food Processing Technology. (3 cr; QP–ChEn 5103; SP–ChEn 4002; A-F only) Introduction to food processing as it interfaces with engineering. Case studies. Engineering economics and practical aspects, food processing, heat transfer, freezing, conduction (unsteady state); thermal processing; extruder design; protein processing; order-of-magnitude estimating; and economic concepts such as ROI, discounted cash flow, and capital estimating.

ChEn 5759. Principles of Mass Transfer in Engineering and Biological Engineering. (2 cr; QP–ChEn 5103 or #P–ChEn 4002; A-F only) Principles of mass transfer in gases, liquids, biological and macromolecular solutions, gels, solid membranes, and capillaries. Porous solids interaction between mass transfer and chemical reaction. Applications in biological, environmental, mineral, and chemical engineering systems.
Course Descriptions

Chemistry (Chem)

Department of Chemistry
Institute of Technology

Chem 101. General Principles of Chemistry. (4 cr; QP–For students not passing placement exam; high school chemistry or equiv, two yrs high school math; high school physics recommended; SP–For students not passing placement exam; high school chemistry or equiv, two yrs high school math; high school physics recommended)
Introduction to chemistry, including elementary organic chemistry. Matter and energy, atoms, compounds, solutions, chemical reactions, mole and chemical calculations, gases, liquids, solids, chemical bonding, atomic and molecular structure, acids, bases, equilibrium. Problem solving emphasized. Physical and chemical properties of hydrocarbons and organic compounds containing halogens, nitrogen, or oxygen.

Chem 1021. Chemical Principles I. (4 cr; QP–Primarily for science or engineering majors; 1001 or passing placement exam; SP–Primarily for science or engineering majors; 1011 or passing placement exam)
Atomic theory; periodic properties of elements; thermodynamics; reaction stoichiometry; behavior of gases, liquids, and solids; molecular and ionic structure and bonding; organic chemistry and polymers; energy sources and environmental issues related to energy use.

Chem 1022. Chemical Principles II. (4 cr; QP–1051 or equiv; SP–1021 or equiv)
Chemical kinetics; radioactive decay; chemical equilibrium; solutions; acids and bases; solubility; second law of thermodynamics; electrochemistry and corrosion; descriptive chemistry of the elements; coordination chemistry; biochemistry; applications of chemical principles to environmental problems.

Chem 1031. Honors Chemistry I. (4 cr; QP–IT honors stu or permission from IT honors office; 1001 or placement exam; SP–IT honors student or, L, permission from IT honors office; A-F only)

Chem 1032. Honors Chemistry II. (4 cr; QP–IT honors student or consent of IT honors office; [1051 or equiv; SP–1031 or equiv; A-F only; IT honors student or consent of IT honors office; A-F only]
Advanced introduction. Chemical kinetics/reaction mechanisms, chemical/physical equilibria, acids/bases, entropy/second law of thermodynamics, electrochemistry/corrosion; descriptive chemistry of the elements; coordination chemistry; biochemistry; applications of chemical principles to environmental problems. Lab emphasizes writing for scientific journals.

Chem 2094. Directed Research. (1-3 cr; QP–#; SP–#)
Learning experience in areas not covered by regular courses. Individually arranged with faculty member.

Chem 2101. Introductory Analytical Chemistry Lecture. (3 cr; QP–1052, 3501; SP–1022 or equiv; #2301)
Prerequisite for chemistry majors. Concepts and methods of measurement by chemical and instrumental analysis, including titrimetry, quantitative spectrophotometric analysis, chromatographic separations, and equilibrium and rate methods.

Chem 2111. Introductory Analytical Chemistry Lab. (2 cr; QP–1052, 3501; SP–1101; Lab for 2101)
High precision methods, acidimetry and complexometry, single and multicomponent analysis by spectrophotometry, analysis of mixtures by ion exchange, and gas chromatography, enzymatic and rate methods.

Chem 2301. Organic Chemistry I. (3 cr; QP–1052 or equiv; SP–1022 or equiv)
Important classes of organic compounds, their constitutions, configurations, and conformations and reactions; relationships between molecular structure and chemical reactivity/properties; spectroscopic characterization of organic molecules.

Chem 2302. Organic Chemistry II. (3 cr; QP–3301; SP–2301)
Reactions, synthesis, and spectroscopic characterization of organic compounds, organic polymers, and biologically important classes of organic compounds such as lipids, carbohydrates, amino acids, peptides, proteins, and nucleic acids.

Chem 2311. Organic Lab. (3 cr; QP–3302; SP–2302 or #2302)
Lab techniques in synthesis, purification, and characterization of typical organic compounds.

Chem 2312. Honors Organic Lab. (5 cr; QP–3301, Chem, [ChemE or BioC major]; SP–1201 or #2201; [Chem or ChemE or BioC] major, A-F only)
Honors organic chemistry lab.

Chem 2910. Special Topics in Chemistry. (1 cr [max 6 cr]; QP–1 qtr 1xxx chemistry or #; SP–1 sem 1xxx chemistry or #-N only)
Topics in chemistry. Opportunities and current research.

Chem 2920. Special Topics in Chemistry. (1 cr [max 6 cr]; QP–1 qtr 1xxx chemistry or #; SP–1 sem 1xxx chemistry or #-N only)
Topics in chemistry. Opportunities and current research.

Chem 3501. Physical Chemistry I. (3 cr; QP–1052, Math 3251, Phys 1253; SP–One yr college chemistry, one yr college physics, one yr college calculus)

Chem 3502. Physical Chemistry II. (3 cr; QP–1052, Math 3251, Phys 1253; SP–One yr college chemistry, one yr college physics, one yr college calculus)

Chem 4094W. Directed Research. (1-5 cr [max 75 cr]; QP–Any 3xxx chem course; #; SP–Any 3xxx or 4xxx chem course, #)
Learning experience in areas not covered by regular courses. Individually arranged with faculty member.

Chem 4101. Intermediate Analytical Chemistry Lecture. (3 cr; QP–5130, 5131, [5501 or 5534]; SP–2101, 2111, 3501; A-F only)
Basic electronic, optical, computer technologies employed in design of chemical instrumentation. Advanced topics in spectroscopy (e.g., FT-nmr, FT-IR, atomic absorption/emission). Electrochemistry. Mass spectrometry.

Chem 4111W. Intermediate Analytical Chemistry Lab. (2 cr; QP–5133, chemistry major; SP–4101, chemistry major; A-F only)
Instrumental techniques, including spectroscopic methods, electrochemical methods, and analysis based on separation. Emphasizes use of computers in data collection and reduction.

Chem 4121. Process Analytical Chemistry. (3 cr; QP–3302, 3306, 5501 or 5534, chemistry engineering major; SP–2302, 2311, 3501, chemical engineering major; A-F only)
Strategies and techniques for analysis. Use of modern instruments, including spectrophotometry, chromatography and electrochemistry.

Chem 4311W. Advanced Organic Chemistry Lab. (2 cr; SP–3302, 3306; SP–2311)
Reactions, techniques, and instrumental methods in synthetic organic chemistry.

Chem 4501. Physical Chemistry I. (3 cr; QP–Grad student, one yr college chemistry, one yr college physics, one yr college calculus; A-F only)

Chem 4502. Physical Chemistry II. (3 cr; QP–Grad student, one yr college chemistry, one yr college physics, one yr college calculus; A-F only)

Chem 4511W. Advanced Physical Chemistry Lab. (2 cr; QP–5501 or 5534, 5502 or 5533, chemistry major; SP–3501-3502, chemistry major)
Experiments illustrating principles and methods of thermodynamics, reaction kinetics, and quantum mechanics.

Chem 4701. Inorganic Chemistry. (3 cr; QP–5501 or 5534; SP–3501 or #3502 or #3502)
Advanced introduction to inorganic chemistry. Periodic trends. Structure and properties of compounds in compounds where s and p electrons are important. Descriptive chemistry of solids and transition metal compounds. Emphasizes transition metal chemistry. Advanced topics in main group and materials chemistry.

Chem 4711W. Advanced Inorganic Chemistry Lab. (2 cr; QP–5702, chem major; SP–4701, chem major; A-F only)
Lab experiments in inorganic/organometallic chemistry illustrating synthetic/spectroscopic techniques.

Chem 5011. Mechanisms of Chemical Reactions. (3 cr; QP–3303 or equiv; SP–2302 or equiv)

Chem 5021. Computational Chemistry. (3 cr; QP–Chem grad or SP–3502 or equiv)

Chem 5201. Materials Chemistry. (4 cr; QP–[3301,5501 or 5534] or SP–3501 or equiv or #)
Crystalline materials/cell units, phase diagrams, defects/interfaces, optical/dielectric properties, electrical/thermal conductivity, X-ray diffraction, thin film analysis, electronic structure, polarons/phonons, solid state chemistry, liquid/molecular crystals, polymers, magnetic/optical materials, porous materials, ceramics, piezoelectric materials, biomedical materials, catalysts.

Chem 5210. Materials Characterization. (4 cr; QP–#; SP–Graduate student or A-F only)
Modern tools/techniques for both bulk- and thin-film characterization. Topics may include ion-solid interactions, Rutherford back scattering, secondary ion mass spectrometry, solid-state NMR, x-ray photoelectron spectroscopy, small-angle x-ray/neutron scattering, transmission/scanning electron/probe microscopy, near-field scanning optical microscopy, porosimetry, adsorption techniques, and ellipsometry.

Chem 5221. Introduction to Polymer Chemistry. (4 cr; QP–[3302, 5502] or SP–5-Mats 5221; [2302, 3502] or #)
Introduction to polymer chemistry. Condensation, radical, ionic, emulsion, and metal catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.
**Child Psychology (CPsy)**

**Institute of Child Development**

**College of Education and Human Development**

**CPsy 2301. Introductory Child Psychology.** (4 cr; QP–OP 4 cr intro psych; SP–4 cr intro psych)

Introduction to the science of child behavior; review of theory and research.

**CPsy 3301. Introductory Child Psychology for Social Sciences.** (4 cr)

The science of child behavior; review of theory and research. Designed for majors in psychology, sociology, and related disciplines; not suggested for child psychology majors.

**CPsy 3308. Introduction to Research Methods in Child Psychology.** (4 cr; QP–CPsy 1301, Psy 1001; SP–2301, Psy 1001; A-F only)

Techniques used in the study of child development; emphasis on collection, organization, and analysis of data.

**CPsy 3360. Child Psychology Honors Seminar.** (2 cr; QP–CPsy honors student; SP–CPsy honors student; A-F only)

Acquaints students with the various research projects and activities in the Institute for Child Development and in related departments. Faculty are invited to discuss their research projects with seminar participants.

**CPsy 4302. Infant Development.** (4 cr; QP–CPsy 1301 or #; SP–CPsy 2301 or #; A-F only)

Perceptual, emotional, social, and cognitive development during the first two years of life; the developing infant in his or her social and physical environment.

**CPsy 4303. Adolescent Psychology.** (4 cr; QP–Psy 1001; SP–Psy 1001; A-F only)

Overview of development in the second decade of life. Interactions of adolescents with family, school, and society.

**CPsy 4310. Special Topics in Child Development.** (1-4 cr; max 12 cr; QP–1301; SP–Psy 1001, A-F only; Topics/credits vary)

**CPsy 4311. Behavioral and Emotional Problems of Children.** (4 cr; QP–CPsy 1301 or equiv; SP–Intro psych; A-F only)

Behavioral and emotional problems of children and adolescents; psychopathology contrasted to normal development; symptoms, causes, course, and prevention of common disorders, excluding physical and sensory handicaps.

**CPsy 4313. Disabilities and Development.** (4 cr; QP–OP 1301 or equiv; SP–Psy 1001)


**CPsy 4329. Biological Foundations of Development.** (4 cr; QP–1301 or equiv; SP–2301 or equiv; A-F only)

Evolutionary theory and behavioral genetics applied to understanding of development of human behavior; formation of species-typical adaptive behavior and individual differences in infancy, childhood, and adolescence.

**CPsy 4331. Social and Personality Development.** (4 cr; QP–CPsy 1301, Psy 1001; SP–CPsy 2301, Psy 1001; A-F only)

Development of social relations and personality; research, methodology, and contrasting theoretical perspectives. Survey of findings on interpersonal and social behaviors, and acquisition of social roles.

**CPsy 4334W. Children, Youth in Society.** (4 cr; QP–1301; SP–2301, A-F only)

Child development principles relative to social policy decision making. Issues in applying theories, findings to problems (e.g., media influences, mainstreaming, day care, child abuse, effects of peer groups).

**CPsy 4336. Development and Interpersonal Relations.** (4 cr; QP–CPsy 1301, CPsy 3331/5331; SP–CPsy 2301 or equiv; CPsy 4331, A-F only)

Processes and functions of interactions with parents and peers; analysis of theory and research on developmental changes and influences.

**CPsy 4341W. Perceptual Development.** (4 cr; QP–1301; SP–2301)

Perceptual learning, development of sensory-perceptual processes.

**CPsy 4343. Cognitive Development.** (4 cr; QP–1301; SP–2301; A-F only)

Cognitive processes; relevant theory, research literature, and methodology.

**CPsy 4345. Language Development and Communication.** (4 cr; QP–CPsy 1301; SP–CPsy 2301; A-F only)

Structure and function of language; factors influencing development; methodological problems, language scales, theory.

**CPsy 4993. Directed Research in Child Psychology.** (1-4 cr; max 4 cr; QP–#; SP–# or SP–4 cr child psych, SP–# or SP–A-F only)

Students serve as teaching assistants in courses with the instructor’s permission. Peer advising opportunities are also available for one credit or more per semester.

**CPsy 4994. Directed Research in Child Psychology.** (1-4 cr; max 4 cr; QP–#; SP–# or SP–A-F only)

Individual empirical investigation. Undergraduates contribute significantly in the planning and implementing of scientific studies while gaining experience and expertise in the methodology of research.

**CPsy 4994H. Directed Research in Child Psychology (Honors Thesis).** (1-4 cr; max 4 cr; QP–#; SP–# or SP–A-F only)

Topics vary at the instructor’s discretion. Students receive credit while interning in metropolitan area.

**Chinese (Chn)**

**Institute of Linguistics and Asian and Slavic Languages and Literatures**

**College of Liberal Arts**

**Chn 1011. Beginning Modern Chinese.** (5 cr)

Speaking and reading modern standard Chinese through structured practice.

**Chn 1012. Beginning Modern Chinese.** (5 cr; SP–1011 or equiv or #)

Speaking and reading of modern standard Chinese through structured practice.

**Chn 1015. Accelerated Beginning Modern Chinese.** (5 cr; SP–Dialect background or prior experience)

Content as Chn 1011-1012, concentrating on pronunciation and Chinese characters. For students with dialect background or prior experience.

**Chn 2011. Intermediate Modern Chinese.** (5 cr; SP–1012 or 1015 or equiv or #)

Modern standard Chinese skills developed further through conversations, writing, and reading.

**Chn 2022. Intermediate Modern Chinese.** (5 cr; SP–3021)

Modern standard Chinese skills developed further through conversation and reading.

**Chn 3031. Advanced Modern Chinese.** (4 cr; SP–3022 or equiv or #)

Reading and analysis of 20th-century texts.

**Chn 3032. Advanced Modern Chinese.** (4 cr; SP–3031 or equiv or #)

Reading and analysis of 20th-century texts.

**Chn 3041. Business Chinese.** (4 cr; SP–3032 or equiv or #)

Reading and analysis of commercial and business texts.

**Chn 3111. Introductory Classical Chinese.** (4 cr; SP–3022 or equiv or #)

Study of classical Chinese through reading and analysis of representative texts.

**Chn 3112. Introductory Classical Chinese.** (4 cr; SP–3111)

Study of classical Chinese through reading and analysis of representative texts.

**Chn 3201. Chinese Calligraphy.** (2 cr)

Appreciation and execution of Chinese calligraphy through guided practice.

**Chn 3202. Intermediate Chinese Calligraphy.** (2 cr; QP–3181 or #; SP–3202 or #)

Advanced techniques of composing Chinese characters using regular style of Chinese calligraphy.

**Chn 4011. Chinese Traditional Literature in Translation I.** (4 cr)

Representative works of Chinese literature in translation from ancient times until the end of the T’ang dynasty.

**Chn 4012. Chinese Traditional Literature in Translation II.** (4 cr)

Representative works of Chinese literature in translation from the end of the T’ang dynasty until the end of the 19th century.

**Chn 4023. 20th-Century Chinese Literature in Translation.** (4 cr; SP–Background in modern Chinese history desirable; knowledge of Chinese language not required)

Main trends in Chinese literature from May 4th, 1919 to 1979, including Taiwanese literature.

**Chn 4024. Contemporary Chinese Literature in Translation.** (4 cr; SP–Background in modern Chinese history desirable; knowledge of Chinese language not required)

Main trends in Chinese literature from 1979 to the present.

**Chn 4121. History of the Chinese Language.** (4 cr; SP–3112)

Sources and methods in the study of the historical development of the Chinese language.

**Chn 4125. Structure of Modern Chinese.** (4 cr; SP–3022 or equiv or #)

Analysis of the grammatical structures of modern standard Chinese.

**Chn 4234. Chinese Poetry in Translation.** (4 cr; SP–No knowledge of Chinese required)

Major themes, genres, and technical conventions of Chinese poetry from the classical age of poetry to the modern period.

**Chn 4235. Chinese Fiction in Translation.** (4 cr; SP–No knowledge of Chinese is required)

An introduction to narrative and fictional traditions in pre-modern China.
Civil Engineering (CE)

Department of Civil Engineering

Institute of Technology

CE 0005. Refresher Course for Civil Engineers. (0 cr; QP–BCE or equivalent degree or completion of Parts I and II of the State Board Examination; QP–BCE or equivalent degree or completion of Parts I and II of the State Board Examination; S-N only)

CE 1101. Civil Engineering Orientation. (1 cr; S-N only) Introduction to the Civil Engineering Department and civil engineering practice. Presented by faculty members and professional engineers.

CE 3101. Computer Applications in Civil Engineering I. (3 cr; QP–CE, GE or EE student, Math 1201, SP–CE, GE or EE student, Math 1272; A-F only) Introduction to computer tools and methods for solving civil engineering problems. Tools include spreadsheets, AutoCAD, Mathcad, and Visual Basic. Methods can include numerical integration, curve fitting, linear and nonlinear equations, and differential equations.

CE 3201. Transportation Engineering. (3 cr; QP–IT, Phys 1251; SP–Phys 1301) Applies law of motion to describe vehicle performance and determine constraints for highway designs. Traffic flow principles and their relation to capacity and level of service. Introduction to geometric design, pavement design, and transportation planning.

CE 3202. Surveying and Mapping. (2 cr; QP–IT, Math 1251; SP–IT or Math 1271, 1272; A-F only) Theory of precision measurements of distance, elevation, angle, and direction of points and lines above, on, or beneath the earth’s surface; establishing such points or lines. Elements of coordinate systems, datum planes, and maps.


CE 3401. Linear Structural Analysis. (3 cr; QP–IT or grad, AEM 3016; SP–IT, AEM 3031; A-F only) Analysis of determinate/indeterminate trusses and frames and of deformation by virtual work; application of energy, slope-deflection, and moment distribution methods to indeterminate structures. Influence lines. Design.

CE 3402. Construction Materials. (3 cr; QP–Upper div IT, AEM 3016; SP–Upper div IT, AEM 3031; A-F only) Basic concepts of behavior mechanisms for construction materials such as concrete, metals, asphalt, plastics, and wood. Standard specifications for material properties. Techniques for testing.


CE 3502. Fluid Mechanics. (4 cr; QP–IT or WPS major, Math 3261, AEM 1015 or 3016; SP–IT or FOR major, Math 2243; AEM 2012 or AEM 2301; A-F only) Fluid statics and dynamics. Kinematics of fluid flow, equations of motion, pressure-velocity relationships, viscous effects, boundary layers. Momentum and energy equations. Lift and drag. Flow in pipes and pipe systems. Hydraulic machinery. Fluid measurements.

CE 4101W. Project Management. (3 cr; QP–Upper div IT; SP–Upper div IT) Survey of broad areas in engineering project management and economics. Project planning, scheduling, and controlling; budgeting, staffing, task and cost control; communicating with, motivating, leading, and managing conflict among team members; engineering economics.

CE 4102W. Capstone Design. (3 cr; QP–CE, CE or EE student, Math 3261, AEM 1015 or 3016; SP–IT or FOR major, Math 2243; AEM 2012 or AEM 2301; A-F only) Fluid statics and dynamics. Kinematics of fluid flow, equations of motion, pressure-velocity relationships, viscous effects, boundary layers. Momentum and energy equations. Lift and drag. Flow in pipes and pipe systems. Hydraulic machinery. Fluid measurements.

CE 4101W. Project Management. (3 cr; QP–Upper div IT; SP–Upper div IT) Survey of broad areas in engineering project management and economics. Project planning, scheduling, and controlling; budgeting, staffing, task and cost control; communicating with, motivating, leading, and managing conflict among team members; engineering economics.

CE 4102W. Capstone Design. (3 cr; QP–CE, CE or EE student, Math 3261, AEM 1015 or 3016; SP–IT or FOR major, Math 2243; AEM 2012 or AEM 2301; A-F only) Fluid statics and dynamics. Kinematics of fluid flow, equations of motion, pressure-velocity relationships, viscous effects, boundary layers. Momentum and energy equations. Lift and drag. Flow in pipes and pipe systems. Hydraulic machinery. Fluid measurements.

CE 4170. Independent Study I. (1-4 cr [max 4 cr]; QP–IT or grad) May be taken more than once; SP–IT Special studies in planning, designing, or analyzing civil engineering systems. Lab problems, literature studies, or reports supervised by staff.

CE 4180. Independent Study II. (1-4 cr [max 4 cr]; QP–IT or grad) May be taken more than once; SP–IT Special studies in planning, designing, or analyzing civil engineering systems. Individual lab research problems, literature studies, reports supervised by staff.


CE 4201. Highway Design. (3 cr; QP–IT or grad, 3200 or 3201 or #; SP–CE or upper div GeoE or grad, 3202, 3201 or #; SP–CE or upper div IT or grad) Vertical and horizontal alignment, earthwork computations, highway capacity, forecast of traffic volume demand, impact of vehicle type on geometric design, intersection design.

CE 4231. Pavement Engineering. (3 cr; QP–IT or grad, 3200, 5603; SP–Upper div IT, CE, 3201, CE 3301, CE 3402 or #; A-F only) Concepts and principles in rigid and flexible pavement design. Traffic loads, soil considerations, and material characteristics for highway and airfield pavement design.

CE 4232. Cemented Materials. (3 cr; QP–Upper div IT or Grad, 5603; SP–Upper div IT or Grad, CE 3402 or #) Characteristics of and lab testing for mineral aggregates; cement, mortar, fresh hardened concrete, and asphalt-cement mixtures. Construction and long-term performance of mixtures.


CE 4311. Rock Mechanics II. (3 cr; QP–IT or grad in IT major, GeoE 3302 or #; SP–Upper div IT or grad, GeoE 3302 or #; SP–Upper div IT or grad, CE 3301, GeoE 3311 or #; A-F only) Failure mechanisms in rock masses. Elasto-plastic solutions applied to underground excavations. Design of linings and support systems; rock-support interaction. In situ stresses and excavation shape. Instrumentation and monitoring.

CE 4331. Geotechnical Geostatistics. (3 cr; QP–CE or Geo or Grad, 3400 or #; A-F only) Statistical interpretation of soil properties. Foundation engineering. Sand and clay shear properties. Classification and engineering properties. Basic geostatistical techniques and applications.

CE 4341. Groundwater Mechanics. (3 cr; QP–IT or grad, 3400, 5602 or #; SP–Upper div IT or grad, 3402 or #; SP–Upper div IT or grad, CE 4351, GeoE 4351 or #; A-F only) Shallow confined and unconfined flows. Two-dimensional flow in vertical plane, transient flow. Flow toward wells. Determination of streamlines and pathlines in two and three dimensions. Introduction to contaminant transport. Elementary computer modeling.

CE 4352. Groundwater Modeling. (3 cr; QP–IT or grad, 5425 or SP–Upper div IT or grad, CE 4351, GeoE 4351 or #; A-F only) Analytic element method. Mathematical and computer modeling of single and multiple aquifer systems. Field problems. Theory and application of contaminant transport models, including capture zone analysis.

CE 4401. Steel and Reinforced Concrete Design. (4 cr; QP–Upper div IT or grad, GeoE 3302 or #; SP–Upper div IT or grad, 5600, 5603; SP–Upper div IT or grad, or #; SP–Upper div IT or grad, CE 4351, GeoE 4351 or #; A-F only) Analytic element method. Mathematical and computer modeling of single and multiple aquifer systems. Field problems. Theory and application of contaminant transport models, including capture zone analysis.

CE 4411. Matrix Structural Analysis. (3 cr; QP–Upper div IT or grad, 5600; SP–Upper div IT or grad, 3401 or #; A-F only) Analysis of linear structural systems by matrix methods, stiffness and flexibility methods. Introduction to computerized structural analysis of trusses and frames, including coding in a programming language.

Course Descriptions
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CE 4412. Reinforced Concrete Design II. (3 cr; QP–IT or grad, 3511; SP–Upper div IT or grad, Or better in 4401 or #; A-F only)
Advanced design of reinforced concrete structural systems: footings, retaining walls, columns with slenderness effects and biaxial loading, torsion, continuous systems, two-way floor systems.

CE 4413. Steel Design II. (3 cr; QP–IT or grad, 5610; SP–Upper div IT or grad, Or better in 4401 or #; A-F only)
Design of steel and composite/steel concrete structures, including multistory frames and plate- guided bridges. Beam-columns, torsion, connections, frames.

CE 4501. Hydrologic Design. (4 cr; QP–IT or grad, 3400 or SP–5302; A-F only)

CE 4502. Water and Wastewater Treatment. (3 cr; QP–IT or grad, 3400, Chem 1052 or #; SP–3501; A-F only)

CE 4511. Hydraulic Structures. (4 cr; QP–IT or grad, 5400, Chem 1022 or #; SP–4501; A-F only)
Hydraulic design procedures for culverts, dams, spillways, outlet works, and river control works. Drop structures, water intakes, bridge crossings. Offered alt yrs.

CE 4512. Open Channel Hydraulics. (4 cr; QP–IT or grad, 3400, 5400, Chem 1022, 3502 or #; A-F only)
Theories of flow in open channels, including gradually varied and rapidly varied flows, steady and unsteady flows. Computational methods for unsteady open channel flows, applications to flooding routes. Introduction to moveable bed mechanics.

CE 4531. Environmental Process Engineering. (3 cr; SP–3501, 4541A; A-F only)
Physical principles that influence behavior of engineered and natural environmental systems. Flow behavior through reactors, mass transfer, interfacial effects, stability, kinetics.

CE 4541. Environmental Water Chemistry. (4 cr; SP–3501, Chem 1021, Chem 1022; A-F only)
Introduction to water chemistry. Physical chemical properties, geochemical processes controlling chemical composition of waters, and behavior of contaminants that affect the suitability of water for various uses. Analytical procedures to measure chemical composition.

CE 4551. Environmental Microbiology/Lab. (4 cr; QP–3500; SP–Upper div, 5201; A-F only)
Role of microorganisms in environmental bioremediation, pollution control, and wastewater treatment, biogeochemistry, and human health. Basic microbiological techniques: isolation, identification and enumeration of bacteria, BOD, biodegradation kinetics, and disinfection. Lecture plus three labs weekly lab.

CE 4561. Solid Hazardous Wastes. (3 cr; QP–IT or grad, Chem 1022, 5201, 5512 or #; SP–3501; A-F only)
Solid and hazardous waste characterization; regulatory legislation; waste minimization; resource recovery; chemical, physical, and biological treatment; thermal processes; disposal practices. Analysis and design of systems for treatment and disposal.

CE 4562. Environmental Remediation Technology. (3 cr; QP–IT or grad, 5401, 5501 or #; SP–3501, 4501; or # A-F only)
Technologies designed for removal of pollutants from ground and surface waters and soils. Advances in technological design. Emerging technologies such as in situ bioremediation, phytoremediation. Role of environmental biotechnology in pollution abatement.

CE 5211. Traffic Engineering. (3 cr; QP–IT or grad, 3200; SP–3201, Stat 3021 or equiv)
Principles of traffic control and driver performance as they apply to the safe and efficient operation of highways. Design and use of traffic control devices. Capacity and level of service. Trip generation and traffic impact analysis. Safety and traffic studies.

CE 5212. Urban Transportation Planning. (3 cr; QP–IT or grad, 3200; SP–Upper div IT or grad, or SP–Upper div IT or grad, CE 4231 or #)
Techniques of analysis and planning for transportation services; demand-supply interactions; evaluating transportation alternatives; travel demand forecasting; integrated model systems; citizen participation in decision-making.

CE 5231. Pavement Management and Rehabilitation. (3 cr; SP–Upper div IT or grad, 5603; SP–Upper div IT or grad, CE 4231 or #)

CE 5232. Advanced Portland Cement Concrete. (3 cr; SP–Upper div IT or grad, CE 4232 or #)
Advanced topics in cement chemistry and selection of materials for and design of portland cement concrete mixtures. Lab assignments pertaining to mixing design and short-term and long-term behavior. Use of admixtures and fiber reinforcement. Effects of proportioning of standard materials.

CE 5233. Advanced Bituminous Materials. (3 cr; SP–Upper div IT or grad, 3402 or #)
Advanced topics in selection and design of bituminous materials. Asphalt cement, rheology, emulsions, chip seals, hot-mix asphalt design, viscoelastic characterization. Lab assignments pertaining to rheology, mixture design and viscoelastic behavior.

CE 5311. Experimental Geomechanics. (3 cr; QP–Upper div IT or grad, 5603; SP–Upper div IT or grad, 4301, GeoE 4301 or #; A-F only)

CE 5321. Geomechanics. (3 cr; QP–Upper div IT or grad; SP–Upper div IT or grad, 4301 or #; GeoE 4301-A-F only)

CE 5331. Geomechanics Modeling. (3 cr; QP–Upper div IT or grad, 3300; SP–Upper div IT or grad, 4301 or #; A-F only)
Soil and rock response in triaxial testing; drained and undrained behavior, elastic and plastic properties. Modeling stresses, strains, and failure in geomechanics problems.

CE 5411. Applied Structural Mechanics. (3 cr; QP–Upper div IT or grad, 5600, AEM 3036; SP–Upper div IT or grad, or better in 4401 or #; A-F only)
Principal stress and failure criteria in 3 dimensions. Introduction to plane elasticity, energy methods, torsion of beams, bending of unsymmetrical beams.

CE 5412. Prestressed Concrete Design. (3 cr; QP–IT or grad, 5611, 5612, 5613 recommended; SP–Upper div IT or grad, or better in 4401 or #; 4412 recommended; A-F only)
Design of prestressed concrete structures. Time dependent effects, behavior, flexure, shear, torsion, deflections, continuous systems.

CE 5413. Masonry Structures. (3 cr; QP–IT or grad, 5600 or #; SP–Upper div IT or grad, or better in 3401 or #; 4401 recommended; A-F only)
Masonry materials and their production; mortars and grouts; design of unreinforced, reinforced, and prestressed masonry structural systems; walls, columns, lintels; arches. Codes and specifications, testing and inspection.

CE 5581. Water Resources: Individuals and Institutions. (3 cr; A-F only)
Control of water resources by natural system functions, user actions, and influence of social, economic, and political institutions. Water resource policy in the United States. Case studies (e.g., flood/ drought management).

CE 5591. Environmental Law for Engineers. (3 cr; SP–Upper div IT or grad or #; SP–Upper div IT or grad or #; A-F only)
Environmental regulatory law relevant to civil and environmental engineering; specific provisions of federal statutory and regulatory laws such as NEPA, CWA, RCRA, CAA, and CERCLA.

Classical Civilization (ClCv)

Department of Classical and Near Eastern Studies
College of Liberal Arts

ClCv 1201. The Olympic Games. (3 cr)
Surveys the Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

ClCv 3201. The Olympic Games. (3 cr)
The Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

ClCv 3340. Practicum in Archaeological Field and Computer Techniques. (3 cr; SP–ClCv major or #; one course in ancient art and archaeology)
Intensive study of major works of classical antiquity and later (written in or translated into English), related by kind, theme, style, or perspective. Sometimes including works from non-Western cultures.

ClCv 3711. Classics of Literary Criticism. (3 cr; SP–1 course in literature, 2nd course in literature or philosophy or #)
Principles of criticism as expounded and employed in major critical works by writers such as Plato, Aristotle, Horace, Longinus, Sir Philip Sidney, John Dryden, Samuel Johnson, David Hume, William Wordsworth, Samuel Taylor Coleridge, and T. S. Eliot.

ClCv 3940. Proseminar: Classical Traditions in Western Culture. (3-4 cr [max 6 cr]; SP–ClCv major or #)
The nature of Greco-Roman classical traditions manifested in various cultural spheres: language and literature, fine arts, history, science, philosophy, theology, and other disciplines; the political, social, educational, and religious life of society. The perspective, scope, breadth, and depth of the course will vary.

ClCv 3950. Topics in Classical Civilization. (3-4 cr [max 9 cr])
Topics specified in the Class Schedule.

ClCv 3993. Directed Studies in Classical Civilization. (1-4 cr)

ClCv 3994. Directed Research in Classical Civilization. (1-4 cr)

ClCv 3996. Directed Instruction in Classical Civilization. (1-4 cr)
Clas 1001. Ancient Greece: Poet and Hero in the Age of Homer. (3 cr)
 Homer and his epic poetry; Trojan war; Greek lyric poets (Sappho and Pindar); early Greek philosophy.

Clas 1002. Ancient Greece: The Golden Age of Athens. (3 cr)
Emergence of democracy in shadows of two brutal wars: one foreign, one civil. Democracy, war, empire through lens of tragedy, comedy, art from 5th-century Athens.

Clas 1003. Ancient Greece: Alexander and the East. (3 cr)
Achievements of Alexander the Great and their effect on the Greek-speaking world; Greek colonization of Egypt; Hellenistic art, literature, and philosophy.

Clas 1004. Ancient Rome: Power, Politics, and the Roman Republic. (3 cr)
The Roman Republic from its origins to Caesar's death.

Clas 1005. Ancient Rome: The Roman Revolution. (3 cr)
Transition from republic to empire; political strategies of Augustus (the first emperor). "Golden age" of Latin literature; the monuments.

Clas 1006. Ancient Rome: The Age of Nero. (3 cr)
The Roman Empire. "Silver age" of Latin literature, rise of Christianity. Art/architecture.

Clas 1023. The Age of Constantine the Great. (3 cr; SP—3023)
Change/continuity in Roman Empire from 2nd-century zenith to 3rd-century crisis, first Christian emperor (AD 306 to 337 A.D.), and beyond. Replacement of classical paganism by Christianity. Beginnings of monasticism. Superpower relations between Roman, Persian empires.

Clas 1024. The Age of St. Augustine of Hippo. (3 cr; SP—3024)
Cultural diversity (A.D. 363 to circa A.D. 500). Replacement of Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople as capital in the East. Literature, art, thought resulting from new dominance of Christianity, particularly Augustine of Hippo. Meets with 3024.

Clas 1042. Greek and Roman Mythology. (4 cr)
Introduction to the stories and the study of Greek and Roman mythology.

Clas 1042H. Honors Course: Greek and Roman Mythology. (4 cr; SP—Honors student or #)
Introduction to stories/study of Greek/Roman mythology.

Clas 1043. Classical Archaeology: Introduction to the Archaeology of Ancient Greece and Rome. (4 cr)
Role that material culture and art and architecture, plays in forming our picture of the Classical past. Relationship between archaeology and other disciplines dealt with during the past. Study of selected sites considers the motives and methods of research and how the results are used by archaeologists and the general public.

Clas 1045. Epigraphy: Word Study in the Sciences and Humanities. (3 cr)
English prefixes, suffixes and roots from Greek and Latin are taught through computer-assisted instruction; techniques of word analysis. Historical overview of Greek and Latin; their relationship with and influence on English.

Clas 1082. Jesus in History. (3 cr)
Jesus of Nazareth in his original setting. Modern approaches to the historical Jesus. Perspectives and needs of early gospel writers and effects on portrayals of Jesus. Shifting representations of Jesus in new historical and cultural situations. Meets with Clas 1182.

Clas 1082H. Honors Course: Jesus in History. (4 cr; SP—3082, §1182, §1082, §2082, §3082, §4082, §5082, §6082, §7082, §8082, §9082, §Honors student or #)

Clas 1142H. Honors Course: Greek and Roman Mythology. (4 cr; SP—Honors student or #)
Introduction to the stories and the study of Greek and Roman mythology.

Clas 1148. Technical Terminology for the Health Professions. (3 cr)
Greek and Latin prefixes, suffixes, and roots basic to the vocabulary of health professions; taught through computer-assisted instruction.

Clas 3001W. Classical Lyric and Satire. (3 cr)
Greek and Roman lyric poetry; Roman satire.

Clas 3008. History of Ancient Art. (3 cr)
Architecture, sculpture, and painting of selected early cultures; emphasis on influences on the development of Western art.

Clas 3023. The Age of Constantine the Great. (3 cr; SP—1023)

Clas 3024. The Age of St. Augustine of Hippo. (3 cr; SP—1024)
Cultural diversity (A.D. 363 to circa 500 A.D.). Replacement of Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople as capital in the East. Literature, art, thought resulting from new dominance of Christianity, particularly Augustine of Hippo. Meets with 1024.

Clas 3035. Classical Myth in Western Art. (4 cr)
An exploration of the role of myth in the visual arts through examination of major figures and stories that became popular in the ancient world and have fascinated artists and audiences ever since.

Clas 3070. Topics in Ancient Religion. (3 cr)
Study of a specific aspect of religion in Classical and Near Eastern antiquity such as healing cults, magic and divination, Gnosticism, or prophecy and authority. Topica specified in the Class Schedule.

Clas 3071. Greek and Hellenistic Religions. (3 cr)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and Olympian deities; ritual performance; prayer and sacrifice, and impact of Greece and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions.

Clas 3072. The New Testament. (3 cr)

Clas 3072H. Honors Course: The New Testament. (4 cr; SP—3072; 3172, §3072, §3172, §Honors student or #)
Early Jesus movement in its cultural/historical setting: origins in Judaism; traditions about Jesus; Paul, his controversies/interpreters; questions of authority, religious practice, structure; emergence of canon. Contemporary methods of New Testament study; biblical writings as history/narrative. Meets with 3072. Honors students meet weekly for recitation section.

Clas 3073. Roman Religion and Early Christianity. (3 cr)

Clas 3081W. Classical Epic in Translation. (3 cr; SP—5081)
Homer's Iliad and Odyssey; Virgil's Aeneid; cultural context of epic; development of the hero; epic style; poetics of epic.

Clas 3082W. Greek Tragedy in Translation. (3 cr)
Origins of tragedy; ancient theatres; selected plays of Aeschylus, Sophocles and Euripides.

Clas 3083W. Ancient Comedy. (3 cr)
Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

Clas 3088. Archaeology in Biblical Lands I: Old Testament Period. (3 cr)


Clas 3142. Art of Egypt. (4 cr)
Arts and architecture of Egypt from prehistoric times to the emergence of modern Egypt, with emphasis on the elements of continuity and of change that have shaped Egyptian culture.

Clas 3143. Advanced Greek and Roman Mythology. (3 cr; SP—1042 or #)
Study of the different theoretical explanations of Greek and Roman mythology.

Clas 3152. Art and Archaeology of Ancient Greece. (4 cr)
Introduction to the civilization of ancient Greece as revealed through art and material culture. Case studies of selected monuments and sites.

Clas 3162. Roman Art and Archaeology. (4 cr)
Introduction to the art and material culture of the Roman World: origin, change and continuity, “progress” or “decay” in the later Empire, and its legacy to the modern world.

Clas 3173. Honors Course: Roman Religion and Early Christianity. (4 cr)

Clas 3201. The Olympic Games. (3 cr)
Surveys the Olympic Games (776 B.C. to A.D. 338) and other ancient athletic festivals, including those for women participants. Greek art and literature serve as basic sources. Comparisons are made with modern athletic events.

Clas 3340. Practicum in Archaeological Field and Computer Techniques. (3 cr; SP—Major or # or 1 course in ancient art and archaeology)
Methods used for excavation of Old and New World sites. Meets at archaeometry/computer lab for part of the semester and at a selected site in Minnesota for day-long sessions for 9 to 10 weeks.

Clas 3940. Topics in Classical Literature. (3 cr; SP—Two literature courses or #)
Selected topics (e.g., ancient novel, pastoral, biography, thematic studies). Specified in Class Schedule.

Clas 3950. Aspects of Classical Culture. (3 cr)
Selected topics in the cultural history of classical antiquity (e.g., women in antiquity, Roman diplomacy, slavery, education). Topics specified in Class Schedule.
Clas 3993. Directed Studies. (1-4 cr [max 18 cr])
Guided individual reading or study.

Clas 5001. Classical Lyric and Satire. (3 cr; SP-#3001, two literature courses or #)
Greek and Roman poetry; Roman satire.

Clas 5013. Roman Law and Society. (3 cr)
Survey of Roman law from social and historical perspectives. Basic concepts of Roman private law and legal procedure.

Clas 5070. Topics in Ancient Religion. (3 cr; SP-RelA 3071 or 3072 or 3073 or 5072 or 5073 or any RelA course or #)
Study of a specific aspect of religion in Classical and Near Eastern antiquity such as healing cults, magic and divination, Gnosticism, or prophecy and authority. Topics specified in Class Schedule.

Clas 5071. Greek and Hellenistic Religions. (3 cr; SP-##3071)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and Olympian deities; ritual performance; prayer and sacrifice; archaic architecture; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3071.

Clas 5072. The New Testament. (3 cr; SP-##3072)

Clas 5073. Roman Religion and Early Christianity. (3 cr; SP-##3073)

Clas 5080. New Testament Proseminar. (3 cr; SP-1082 or 3072 or equiv)
Study of some specific aspect of the New Testament and related literature. The class is organized as a discussion seminar. Topics specified in Class Schedule.

Clas 5081. Classical Epic in Translation. (3 cr; SP-#3081)
Homer’s Iliad and Odyssey; Virgil’s Aeneid; cultural contexts of epic; development of the hero; epic style; poetics of epic.

Clas 5082W. Greek Tragedy in Translation. (3 cr; SP-#3082)
Origins of tragedy; ancient theatres; selected plays of Aeschylus, Sophocles and Euripides.

Clas 5083. Ancient Comedy. (3 cr; SP-#3083)
Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

Clas 5085. Greek Philosophy: The Pre-Socratics to Plato. (3 cr)
Fragments of the pre-Socratics and Sophists and selected dialogues of Plato.

Clas 5088. Archaeology in Biblical Lands I: Old Testament Period. (3 cr; SP-#3088)

Clas 5089. Archaeology in Biblical Lands II: New Testament Period. (3 cr; SP-#3089)

Clas 5103. Hellenistic and Early Roman Art and Archaeology. (3 cr; SP-#3103, Clas/ArtH 3008 or #)
Sculpture, architecture, painting, and topography in developing centers of Hellenistic culture in eastern Mediterranean and in Etruscan and Roman towns from 400 B.C. to the beginnings of the Roman Empire.

Clas 5108. Greek Architecture. (3 cr; SP-#3108, Clas/ArtH 3008 or #)
Geometrical through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor and Italy.

Clas 5111. Prehistoric Art and Archaeology of Greece. (3 cr; SP-#3111, Greek art or archaeology course or #)
Artistic and architectural forms of Neolithic period in the Aegean area and Cycladic, Minoan, and Mycenaean cultures. Aims and methods of modern field archaeology; the record of human habitation in the Aegean area. Archaeological evidence as a basis for historical reconstruction.

Clas 5112. Archaic and Classical Greek Art. (3 cr; SP-#3112, Clas/ArtH 3111)
Sculpture, painting, architecture and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture; archaeological problems such as identifying and dating buildings; analysis of methods and techniques. Emphasis on Periklean Athens.

Clas 5120. Field Research in Archaeology. (3 cr; SP-#3120)
Field excavation, survey, and research at archaeological sites in the Mediterranean area. Techniques of excavation and exploration; interpretation of archaeological materials.

Clas 5145. Advanced Greek and Roman Mythology. (3 cr; SP-#3145, 1042 or #)
Different theoretical approaches to Greek/Roman mythology.

Clas 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr; SP-Intra art history course or #)
The architecture, painting, and sculpture of urban houses, country estates, and tombs in the Roman world. Relationships between public and private spheres, and literary and physical evidence; usefulness of the physical evidence in illuminating gender roles.

Clas 5182. Art and the State: Public Art in the Roman Empire. (3 cr; SP-Intra art history course or #)
Origins of Roman public art; use in maintaining community; exploitation by the first emperor, Augustus; development and diffusion through the later empire; varying capabilities to adjust to the demands of a Christian Empire.

Clas 5252. History of Early Christian Art in Context. (3 cr; SP-3xxx art history course or #)
Role played by art in the formation of early Christian and Byzantine communities, and in establishing their relationships with the Pagan world and early Islam.

Clas 5340. Practicum in Archaeological Field and Computer Techniques. (3 cr; SP-#3340, CIVC major or ancient art and archaeology course or #)
Methods used for excavation of Old and New World sites. Meets at archaeology/computer lab for part of the semester and at a selected site in Minnesota for day-long sessions for 9 to 10 weeks. Meets with 3340.

Clas 5794. Introduction to Classical and Near Eastern Studies. (1 cr; SP-Grad major or minor or #; S-N only)
Introduction to core research materials and reference materials in the various disciplines which make up classical studies.

Clas 5940. Topics in Classical Literature. (3 cr [max 9 cr]; SP-#3940, two literature courses or #)
Additional work for graduate credit. Topics specified in Class Schedule. Meets with 3940.

Clas 5950. Aspects of Classical Culture. (3 cr; SP-#3950)
Topics specified in Class Schedule. Meets with 3950.

Clas 5993. Directed Studies. (1-2 cr; SP-#, #)
Guided individual reading or study.

Clas 5994. Directed Research. (1-12 cr; SP-#, #)

Clas 5996. Directed Instruction. (1-12 cr; SP-#, #)

Clinical Laboratory Science (CLS)

Department of Laboratory Medicine and Pathology

Medical School

CLS 5064. Introduction to Clinical Immunohematology. (2 cr; SP-#A-F only)
Principles of blood grouping, antibody identification, compatibility testing, serology, and immunology.

CLS 5065. Introduction to Clinical Immunohematology/Laboratory. (2 cr; SP-#A-F only)
Exercises illustrating techniques in blood grouping, antibody identification, compatibility testing, and detection of antibodies by serological and immunological methods.

CLS 5090. Special Laboratory Methods. (1-2 cr; SP-#A-F only)
Assignment on an individual basis to one of a variety of special areas of experience in the clinical lab.

CLS 5100. Virology, Mycology, and Parasitology for Medical Technologists. (3 cr; Microbiology course with lab, biochem course; A-F only)
Lab diagnosis of viral, fungal, and parasitic infections. Lecture.

CLS 5102. Principles of Diagnostic Microbiology. (4 cr; SP-Microbiology course with lab, biochem course. Instructor consent required; A-F only)
Techniques in lab diagnosis of infectious disease; isolation/identification of bacteria/yeasts. Antimicrobial susceptibility testing. Lecture, lab.

CLS 5120. Seminar: Clinical Laboratory Science. (1 cr [max 2 cr] SP-# S-N only)
Current literature. Presentation/discussion of research.

CLS 5121. Journal Presentations. (1 cr [max 2 cr]; SP-Grad major or minor or #; S-N only)
Critical analysis, evaluation of current journal articles in student’s specialty area.

CLS 5125. Practicum Teaching. (1-2 cr; SP-#A-F only)
Supervised teaching experience, develop skills using instructional materials, tests, and measurements.

CLS 5127. Introduction to Management and Education I. (1 cr; SP-#A-F only)
Supervised experience and assignment of specific problems related to lab service and management in health care institutions.

CLS 5135. Advanced Clinical Microbiology. (3 cr; SP-#)
Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5140. Techniques for Teaching. (2 cr; SP-#A-F only)
Developing objectives, classroom activities, and evaluation criteria for medical technology education.

CLS 5155. Advanced Clinical Hematology. (3 cr; SP-#)
Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5165. Advanced Clinical Immunohematology. (3 cr; SP-#)
Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5175. Advanced Clinical Chemistry. (3 cr; SP-#)
Observation, study, and practice in special problems, advanced techniques, and methodology.
Course Descriptions

College of Veterinary Medicine (CVM)

Course of Veterinary Medicine

CVM 1000. Introduction to Veterinary Medicine. (1 cr; S-N only)
History of veterinary profession, careers within the profession, employee roles and responsibilities. Introduction to admission to DVM. Veterinary technology programs.

CVM 3502. Animal Health and Disease. (3 cr; QP–Biol 1009 or [Biol 1001, Biol 1002]; SP–Biol 1009; A-F only)

Communication Disorders (CDIs)

Department of Communication Disorders

College of Liberal Arts

CDis 1301W. The Physics and Biology of Spoken Language. (4 cr)
Physics and biology of spoken language, from the talker's production of sounds and words, to the transmission of sound, to the listener's perception of what was said. Computer analysis and synthesis of speech.

CDis 1401. Introduction to Communication Disorders. (4 cr)
Processes and impairments of human oral communication. Fluency, phonology, voice disorders including laryngeotomy, cleft palate, language disorders, augmentative communication, hearing and hearing impairment. Identification and intervention strategies.

CDis 3301. Introduction to Acoustics. (3 cr)
Elements of acoustics necessary to understand quantitative aspects of speech and hearing science, speech-language pathology, and audiology. Nature of sound, sound transmission, simple harmonic motion, sound intensity and pressure, complex waves, resonance and filtering, and distortion.

CDis 3302. Anatomy and Physiology of the Speech and Hearing Mechanisms. (3 cr)
Gross anatomy and basic physiology of the nervous, auditory, respiratory, laryngeal, velopharyngeal, and orofacial systems with emphasis on normal communication processes.

CDis 3303. Language Acquisition and Science. (4 cr)
Survey of typical language development and major theoretical perspectives about development. Applications of current theory to analysis of children's language.

CDis 3304. Phonetics. (3 cr)

CDis 3305W. Speech Science. (3 cr; QP–5301, 5302, 5303 or #; QP–5301, 5302, 5304 or #)
A survey of theories, methods, and research in the discipline of speech science, including speech acoustics, speech perception, and speech production.

CDis 3306. Hearing Science. (3 cr; QP–5301, 5302 or #; QP–5301, 5302 or #)
Theories, methods, and research in psychological and physiological acoustics with emphasis on the relation between physiological measures and perception. Topics include cochlear mechanics, auditory nerve firing patterns, scaling, and object perception.

CDis 3401W. Communication Disorders and Cultural Diversity. (3 cr)
Examination of the influence of culture on communication disorders and the role of the speech-language pathologist in serving increasingly diverse populations in public schools.

CDis 3402W. Major Project in Speech and Hearing Science. (3 cr; QP–Fr or more than 36 cr or CDis major; S-N only)
Seminar for completion of the undergraduate major project paper by students in their junior or senior years.

CDis 4301. Neural Bases of Communication. (3 cr)
Basic neuroanatomy and neurophysiology, especially as they relate to normal speech, language, and hearing processes.

CDis 4501. Speech Disorders. (3 cr; QP–5302 or #; SP–3302 or #)
Current concepts of the nature and treatment of disorders related to voice, resonance fluency, and swallowing. Disorders associated with dysarthria, cleft palate, laryngectomy, stuttering, voice quality, and dysphagia.

CDis 4601. Language Disorders. (3 cr; QP–5305 or #; SP–3303 or #)
Acquaints students with language delay and disorders and offers an overview of assessment and intervention strategies that are commonly used by speech/language pathologists.

CDis 4801. Hearing Measurement and Disorders. (4 cr; QP–[5301, 5302] or #; QP–[3301, 3302] or #)
Introduction to theory, administration, and interpretation of behavioral/physiological hearing tests for all age groups. Immittance, pure tone, speech, otoacoustic emissions, evoked potential measures. Emphasizes hearing-screening protocols.

CDis 4802. Rehabilitative Audiology. (3 cr; QP–5304, 5701 or #; SP–3305, 4801 or #)
Survey of sensory aids and methods used in rehabilitation across the life span after the diagnosis of hearing loss. Discussion of degree of hearing loss, developmental level, communication modalities, client/family choice, disability, and cultural considerations.

CDis 4803. Hearing Loss in Children: Rehabilitation. (3 cr; QP–1304 or #; SP–1301 or #)
Oral language, listening, and speech production skills in infants and children with hearing losses. The normal developmental processes of speech perception and production, specific methodologies of auditory and speech production training, oral language intervention, and discussion of existing curricula.

CDis 5401. Counseling and Professional Issues. (4 cr; QP–Fr or no more than 36 cr or CDis major)
Course Descriptions

CDis 5501. Fluency Disorders. (3 cr; QP–#; SP–4501 or #)
Description, nature, and treatment of fluency disorders in children and adults. Involvement in therapeutic and research activities.

CDis 5502. Voice and Resonance Disorders. (3 cr; QP–#; SP–3305, 4301, 4501 or #)

CDis 5504. Dysphagia. (3 cr; QP–5509 or #; SP–3305, 4301, 4501, or #)
Normal and disordered aspects of swallowing. The nature, etiologies, evaluation, and management of swallowing disorders will be covered.

CDis 5502. Phonological Disorders. (3 cr; QP–#; SP–3304, 4601 or #)
Theoretical research related to the nature, assessment, and treatment of phonological disorders in children.

CDis 5503. Communication Assessment and Intervention: Preschoolers and Persons With Severe Disabilities. (3 cr; QP–#; SP–4601 or #)
Assessment and intervention options for school age children with communication delays or disorders and for older individuals who experience severe developmental disabilities.

CDis 5604. Language Assessment and Intervention: School Age Children. (3 cr; QP–#; SP–4601 or #)

CDis 5605. Language and Cognitive Disorders in Adults. (3 cr; QP–#; SP–3302, 4301, 4601 or #)
Neurocognitive communicative and cognitive disorders in adults, including aphasia, right-hemisphere syndrome, traumatic brain injury, and dementia. Consideration of neurologic substrates, assessment and diagnosis, and clinical intervention.

CDis 5606. Introduction to Augmentative and Alternative Communication. (3 cr: QP–#; SP–4501, 4601 or #)
Description of the range of augmentative and alternative communication applications for persons with developmental and acquired disabilities.

CDis 5607. Electronic Communication Aids. (3 cr; QP–#; SP–5606 or #)
Operational procedures for dedicated augmentative communication aids and related software applications. Design and implement assessment and intervention strategies relevant to dynamic and fixed display devices. Troubleshoot common technical difficulties encountered by individuals using electronic communication aids.

CDis 5801. Audiologic Assessment I. (3 cr; QP–7501 or #; SP–4801 or #)
Basic audiometric battery including pure tones, speech, masking, and immittance in adults; industrial audiology and ototoxic acoustic emissions.

CDis 5802. Hearing Aids I. (3 cr; QP–5304, 5701 or #; SP–3305, 4801, or #)
Survey of modern hearing aids including history of development, electroacoustic functions, clinic and laboratory measurement techniques, sound field acoustics, techniques for selection.

CDis 5803. Hearing Loss in Children: Diagnosis. (3 cr; QP–7501 or #; SP–4801 or #)
Behavioral, physiological approaches to assessment and identification, development of the auditory mechanism, etiologies of hearing losses in infants, children, selection of sensory aids, principles of case management with children and families.

CDis 5810. Laboratory Module in Audiology, (1 cr; QP–7501 or #; SP–4801 or #)
Intensive study of clinical methods in audiology. Designed to supplement didactic courses in the audiology curriculum; enhance skills through laboratory study individually or in small groups.

CDis 5900. Topics: Communication Disorders. (2 cr)
Topics listed in Communication Disorders office.

CDis 5993. Directed Study. (1-12 cr [max 18 cr]; QP–#; SP–#)
Directed readings and preparation of reports on selected topics.

Comparative Literature (CLit)

Department of Cultural Studies and Comparative Literature

CLit 5331. Discourse of the Novel. (3 cr; SP–§CSCL 5331)
Comparative study of the novel (eighteenth century to present); its relation to ordinary language practice; emerging public cultures, technologies of cultural dissemination, problems of subjectivity; its role in articulating international cultural relations.

CLit 5555. Introduction to Semiotics. (3 cr; SP–§CSCL 5555)
Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).

CLit 5751. Basic Concepts of Cinema. (4 cr; SP–§CSCL 5751, §CSDS 5751)
Cinema as object of theoretical/historical analysis. Emphasizes concepts that have transformed scope/aim of film analysis since 1960s. Readings of filmic/theoretical texts.

CLit 5910. Topics in Comparative Literature. (3 cr [max 24 cr])
Topics specified in Class Schedule.

CLit 5992. Directed Reading in Comparative Literature. (1-3 cr [max 9 cr]; SP–#)
Guided individual reading and study.

Comparative Studies in Discourse and Society (CSDS)

Department of Cultural Studies and Comparative Literature

CSDS 5301. Society, Ideology, and the Production of Art. (3 cr; SP–§CSCL 5301)
Recent critical theories of relations of art to social/ideological forces. Selected artifacts from Western culture (e.g., Renaissance to 20th century; high, popular, mass culture). Music, visual art, literature.

CSDS 5302. Aesthetics and the Valuation of Art. (3 cr; SP–§CSCL 5302)
Society, ideology, aesthetic value in light of recent critical theories of visual art, music, literature. Mediations of place, social class, gender, ideology on aesthetic judgment in post-renaissance Western culture.

CSDS 5751. Basic Concepts of Cinema. (4 cr; SP–§CSCL 5751, §CLA 5751)
Cinema as object of theoretical/historical analysis. Emphasizes concepts that have transformed scope/aim of film analysis since 1960s. Readings of filmic/theoretical texts.

CSDS 5910. Topics in Comparative Studies in Discourse and Society. (3 cr [max 24 cr])
Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics specified in Class Schedule.

CSDS 5993. Directed Study. (1-3 cr [max 9 cr]; SP–#)
Guided individual reading and study.

Computer Science (CSci)

Department of Computer Science

Institute of Technology

CSci 1101. Introduction to Computing and Problem Solving. (3 cr)
Problem solving and introduction to programming. Students write simple programs in pseudocode and in one or more simple programming languages such as Java, C++ or Scheme. Assumes no programming background and is good preparation for Csci 1113.

CSci 1103. Introduction to Computer Programming in Java. (3 cr)
For students who have no programming knowledge. Introduction to object-oriented programming concepts using Java.

CSci 1107. Introduction to FORTRAN Programming for Scientists and Engineers. (3 cr; QP–Math 1251 or Math 1251 or Math 1271 or Math 1271 or Math 1371 or Math 1371 or #)
Algorithm development and principles of computer programming using FORTRAN. Emphasizes numerical methods for science and engineering applications.

CSci 1113. Introduction to C/C++ Programming for Scientists and Engineers. (4 cr; QP–Math 1251 or Math 1251 or Math 1271 or Math 1271 or Math 1351-SP–Math 1271 or Math 1371 or Algorithm development and principles of computer programming using C/C++. Emphasizes programming concepts for publishing dynamic contents.

CSci 1901. Structure of Computer Programming I. (4 cr; QP–Math 1271 or equiv, fr or soph or jr or #; SP–Math 1271 or equiv, fr or soph or jr or #)
Principles of programming. Different programming paradigms (message-passing, data-driven, event-driven). Students develop algorithms/data types using language such as Scheme and techniques such as abstraction, procedures, recursion, iteration.

CSci 1902. Structure of Computer Programming II. (4 cr; QP–3317, §CSCI 3101, fr or soph or jr or #; SP–Math 1271 or equiv, fr or soph or jr or #)
Object-oriented programming using language such as C++ or Java. Builds on 1901, presenting additional data structures/algorithms. Object-oriented approach to implement data structures/operations as abstract data types.

CSci 2111. Discrete Structures of Computer Science. (4 cr; QP–Math 1252 or Math 1352; SP–Math 1272 or Math 1372 or #)
Foundations of discrete mathematics. Sets, sequences, functions, big-O, propositional and predicate logic, proof methods, counting methods, recursion and recurrences, relations, trees/graph fundamentals.

CSci 2121. Machine Architecture and Organization. (4 cr; QP–3321, §CSCI 3902 or #)
Introduction to hardware and programming in assembler language: transistors, integrated circuits, logic gates, Boolean algebra, computing devices, data representation, number systems, computer organization.
Course Descriptions

CSci 2031. Introduction to Numerical Computing. (4 cr; QP-Math 3261; SP-Math 2243 or #) CSci 5301) Introduction to numerical computing for CSci, mathematics, and science/engineering students. Uses Mathemtica or Matlab to cover numerical error, root finding, systems of equations, interpolation, numerical differentiation and integration, least squares, and differential equations.

CSci 2101W. Social, Legal, and Ethical Issues in Computing. (3 cr; QP-At least soph; SP-52109; At least soph or #) Impact of computers on society. Computer science perspective of ethical, legal, social, philosophical, political, and economic aspects of computing.

CSci 2109. Social, Legal, and Ethical Issues in Computing (non-WI). (3 cr; QP-At least soph; SP-$52109$; At least soph or #) Impact of computers on society. Computer science perspective of ethical, legal, social, philosophical, political, and economic aspects of computing.


CSci 2890. Special Topics in Computer Science. (1-4 cr [max 1 cr]; QP-#; SP-A-F only) Special topics. Lectures, informal discussions.

CSci 3070. Industrial Student Co-op Assignment. (2 cr; QP-SCSI, in coop program; SP-SCSI, in coop program) SN only Industrial work assignment in a coop program involving advanced computer technology. Reviewed by a faculty member. Grade based on final written report covering the work assignment.

CSci 3980. Undergraduate Colloquium. (1 cr; max 2 cr; QP-Upper div CSci) can be repeated for cr; SP-Upper div CSci) can be repeated for cr) Current computing trends and hot topics; industrial and career related topics; research topics; research projects and undergraduate research opportunities; graduate school options.


CSci 4041. Algorithms and Data Structures. (4 cr; QP-3311 and 3321; SP-1902 and 2011 or #) cr for grads in CSci) Rigorous analysis of algorithms and their implementation. Algorithm analysis, sorting algorithms, binary trees, heaps, priority queues, heapsort, balanced binary search trees, AVL trees, hash tables and hashing, graphs, graph traversal, single source shortest path, fixed dimensions, lower bound techniques.


CSci 4081W. Introduction to Software Engineering. (4 cr; QP-3311, 3321; SP-$5801$, $4081$; 1902, 2011) or # no cr for grads in CSci) Basic theory/practice of software engineering. Software development, requirements/specifications, design, verification, and validation.

CSci 4089. Introduction to Software Engineering (non-WI). (4 cr; QP-3311, 3321; SP-$5801$, $4081$; 1902, 2011) or # no cr for grads in CSci) Basic theory/practice of software engineering. Software development, requirements/specifications, design, verification, and validation.

CSci 4921. History of Computing. (3 cr; QP-$5H$sci 3321; SP-$5H$sci 4321) Development of important concepts, particularly 1 last 150 years; evolution of hardware and software; growth of computer and semiconductor industries and their relation to other businesses; changing relationships resulting from new data-gathering and analysis techniques; automation; social and ethical issues.

CSci 4970W. Advanced Project Laboratory. (3 cr; max 9 cr; QP-5102, #; SP-$5H$div CSci, 4061; #) cannot be taken for grad cr) Formulate and solve open-ended project: design, implement, interface, document, test. Team work strongly encouraged. Arranged with CSci faculty.

CSci 5103. Operating Systems. (3 cr; QP-5102; SP-4061 or #) Conceptual foundation of operating system designs and implementations. Relationships between operating system structures and implementation mechanisms as examples.

CSci 5106. Programming Languages. (3 cr; QP-3322, 3327; SP-4011 or #) Design and implementation of high-level languages. Course has two parts: (1) language design principles, concepts, constructs, (2) language paradigms, applications. Note: course does not teach how to program in specific languages.

CSci 5107. Computer Graphics. (3 cr; QP-3322, SP-4041 or #) Introduction to theory and practice of graphics programming. Graphics programming fundamentals: overview of 2D graphics and algorithms, 3D modeling and rendering techniques, animation, and scientific visualization. Graphics language currently used is OpenGL.


CSci 5115. User Interface Design, Implementation and Evaluation. (3 cr; QP-3322; SP-4041 or #) Theory, design, programming, and evaluation of interactive application interfaces. Human capabilities and limitations, interface design and engineering, prototyping and interface construction, interface evaluation, and evolution as data visualization and World Wide Web. Course is built around a group project.

CSci 5116. GUI Toolkits and Their Implementation. (3 cr; QP-5107 or 5110; SP-5115 or 5107 or #) Structure and implementation of toolkits and frameworks. Aspects of GUI toolkits (e.g., window system protocols, event processing, geometry management, resource management, data management, constraints). Course is built around implementation assignments and case studies of toolkits.

CSci 5131. Internet Programming. (3 cr; QP-5106 or 5211; 5180, 5702 recommended; SP-5106 or 5211 or #; 4081 or 5801, 5707 recommended) Issues in internet computing: Java programming, concurrent programming, workflow, distributed databases, security, collaborative computing, object-oriented architecture/design, network publishing, messaging architecture, distributed object computing, internets.

CSci 5161. Introduction to Compilers. (3 cr; QP-5106; SP-4011 or #) Theories and mechanics of programming language processing tools. General computer organization: lexical scanner, syntax parser, symbol table, internal program representation, code generator. Relationship between design and implementation. Run-time memory management mechanism.

CSci 5201. Computer Architecture. (3 cr; QP-3327; SP-2021) Introduction to computer architecture. Pipelining, memory hierarchy, and input/output systems. Performance metrics. Examination of each component of a complicated computer system.

CSci 5211. Data Communications and Computer Networks. (3 cr; QP-5102; SP-4061 or #) Network and distributed programming concepts using C, C++, or Java on UNIX or PC platforms. TCP/IP, sockets, and RPC. Hands on experience with network components. Students plan, configure, install, diagnose, performance tune, operate, and manage state-of-the-art computer networks, internetworking devices, and protocols.

CSci 5283. Computer-Aided Design I. (3 cr; QP-3327; SP-2021 or #) CAD for digital systems. Emphasizes VLSI. Hardware description languages, synthesis, simulation, test generation.


CSci 5301. Numerical Analysis. (3 cr; QP-Math 3261; SP-Math 2243 or #) Fundamentals of numerical analysis. Differents from 2031 by covering different topics and in more detail. Floating point arithmetic and roundoff error, linear/nonlinear equations, matrix eigenvalue problems, linear programming.

CSci 5302. Analysis of Numerical Algorithms. (3 cr; QP-Math 3261; SP-5301 or #) Additional topics in numerical analysis: interpolation, approximation, extrapolation, numerical integration and differentiation, numerical solutions of ordinary differential equations.


CSci 5403. Computational Complexity. (3 cr; QP-5400; SP-4041 or #) Computational models, complexity measures in each model, and related complexity classes.


CSci 5442. Computational Geometry and Applications. (3 cr; QP-5421; SP-5421 or #) Designing efficient algorithms and data structures for geometric problems; models of computation, convex hulls, duality, multidimensional search, Voronoi diagrams and Delaunay triangulations, linear programming in fixed dimensions, lower bound techniques. Applications and advanced topics.
Course Descriptions

CSci 5451. Introduction to Parallel Computing: Architectures, Algorithms and Programming. (3 cr; QP–4222; SP–4041 or #)
Parallel architectures design, embeddings, routing, examples of parallel computers, fundamental communication operations, performance metrics, parallel algorithms for sorting, matrix problems, graph problems, dynamic load balancing, types of parallelism, parallel programming paradigms, message passing programming in MPI, data parallel programming in Free Form, shared-address space programming in threads.

CSci 5511. Artificial Intelligence I. (3 cr; QP–3311; SP–5011 or #)

CSci 5512W. Artificial Intelligence II. (3 cr; QP–5511; SP–5519; SP–5511 or #)

CSci 5519. Artificial Intelligence II (non-WIL). (3 cr; QP–5511; SP–5519; SP–5511 or #)

CSci 5521. Pattern Recognition. (3 cr; QP–5301, Stat 3091; SP–5301, Stat 3021 or #)

CSci 5551. Introduction to Intelligent Robotic Systems. (3 cr; QP–5511; SP–5511 or #)
Transformations, kinematics/inverse kinematics, dynamics, control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, and micro robotics.

CSci 5561. Computer Vision. (3 cr; QP–5511; SP–5511 or #)
Issues in perspective transformations, edge detection, image filtering, image segmentation, and feature tracking. Complex problems in shape recovery, stereo, active vision, autonomous navigation, shadows, and physics-based vision. Applications.

CSci 5571. Expert Systems. (3 cr; QP–5511; SP–5511 or #)
Introduction to ideas and issues of expert systems. Knowledge representation, problem-solving, search, inference techniques, theorem proving. Use of an expert system shell.

CSci 5570. Principles of Database Systems. (3 cr; QP–3222; SP–4041 or #)

CSci 5578. Architecture and Implementation of Database Management Systems. (3 cr; QP–3702; SP–5707 or #)

CSci 5801. Software Engineering I. (3 cr; QP–3516; SP–5011, 1902 or #) 104811
Advanced concepts to software engineering. Reviews and expands on 4081. Software life cycle; development models; software requirements analysis; software design, coding, and maintenance.

CSci 5802. Software Engineering II. (3 cr; QP–5180; SP–5081 or #)
Introduction to software testing, software maturity models, cost specification models, bug estimation, software reliability models, software complexity, quality control, and experience report. Student groups specify, design, implement, and test partial software systems. Application of general software development methods and principles from SP581.

CSci 5980. Special Topics in Computer Science. (1-3 cr; max 9 cr; QP–# SP–#)
Lectures and informal discussions on current topics in computer science.

CSci 5991. Independent Study. (1-3 cr; max 9 cr; QP–#; may be repeated for cr; SP–#; may be repeated for cr)
Independent study arranged with CS faculty member.

CSci 5994. Directed Research. (1-3 cr; max 9 cr; QP–#; may be repeated for cr; SP–#; may be repeated for cr)
Directed research arranged with faculty member.

CSci 5996. Curricular Practical Training. (1-3 cr; max 9 cr; QP–#; may be repeated for cr; SP–#; may be repeated for cr)
Directed research arranged with advanced computer technology. Reviewed by faculty member. Grade based on final report covering work assignment.

Construction Management (CMgt)

College of Continuing Education

CMgt 3001. Construction and Society. (2 cr; A-F only)
Introduction to construction/processes that shape our environment. Construction types, their differences. Key participants, their vocabulary, delivery systems. Construction specialists, their roles. Elements of construction management. Lectures, field trips.

CMgt 4011. Construction Documents and Contracts. (2 cr; SP–Technical writing course [available at North Hennepin or Inver Hills Community College] or equiv or # primarily for BCM students or those working in construction industry)
Definition, interpretation, drawings, specifications, agreements, bidding forms, general conditions, bonds, contracts, subcontracts, related documents.

CMgt 4012. Risk Management, Bonds, and Insurance. (2 cr)
Primarily for students in the BCM program or those working in construction. Identification of parties, property damage, insurance, financial and risk management. Insurance, marketing, pricing, underwriting, and financial analysis. Claims administration.

CMgt 4013. Legal and Ethical Issues in Construction. (2 cr; QP–4011, [BCM or upper div or working in construction industry]; SP–4011, [BCM or upper div or working in construction industry])

CMgt 4015. Introduction to Digital Technologies in the Construction Industry. (2 cr; SP–[Computer literacy, upper div construction management degree] recommended; A-F only)
Role of information technology in the construction industry. Current/future uses of technology by owners, general contractors, subcontractors, facilities management personnel. Networking, databases, wireless communication, software selection, Web-based project management, online plan rooms.

CMgt 4016. Construction Software. (2 cr; QP–4015 recommended; SP–4015 recommended; A-F only)

CMgt 4017. Web-based Project Management. (2 cr; QP–4015 recommended; SP–4015 recommended; A-F only)
Selection/implementation of Web-based project management tools. Software such as Bidcom, E-bUILDER, Bricnet, Constructware, Framtech. Hands-on work with live building sites.

CMgt 4018. Digital Communication Technologies. (2 cr; QP–4015 recommended; SP–4015 recommended; A-F only)
Digital technologies in the construction industry. Wired/wireless communication, online plan/bid rooms, mobile computing, video conferencing.

CMgt 4021. Construction Planning and Scheduling. (2 cr; QP–CPSM 2860 [available through NHCC]; SP–CPSM 2860 [available through NHCC]; A-F only)
Project planning, scheduling, control. Considering/understanding alternatives. Industry techniques (e.g., critical path). Computer-based scheduling on personal computers. Updating/analyzing project schedules.

CMgt 4022. Construction Estimating. (2 cr; SP–Construction Estimating and Critical Path Method [available at North Hennepin or Inver Hills Community College] or equiv or # primarily for BCM students or those working in construction industry)
Introduction to methods of performing estimates, organizing bidding processes, evaluating subcontractor proposals, unit pricing, using published resources, and preparing system-based estimates. Personal computer programs, spreadsheets, custom applications.

CMgt 4023. Value Engineering. (2 cr)
Primarily for students in the BCM program or those working in construction. Step-by-step approach of defining building system and materials function, allocating cost, defining alternative methods for performing, and evaluating to yield the best value.

CMgt 4024. Estimating and Value Engineering. (4 cr; QP–4022, 4023, CPSM 2860 [available at NHCC]; SP–4022, 4023, CPSM 2860 [available at NHCC]; A-F only)

CMgt 4030. Construction Safety and Loss Control. (2 cr; QP–Upper div; SP–Upper div; A-F only)

CMgt 4040. Preparation of Specifications and Technical Writing for Construction Professionals. (3 cr; QP–4011; SP–4011)

CMgt 4133. Directed Study. (1-4 cr; SP–#)
Topic arranged with BCM academic adviser.

CMgt 4196. Construction Management Internship. (3-4 cr; max 12 cr; QP–BCM Student; SP–BCM Student)
Professional experience internship requirement for BCM program. Subject to faculty adviser approval.
Coptic (Copt)

Department of Classical and Near Eastern Studies
College of Liberal Arts

Copt 5001. Elementary Coptic. (3 cr)
Introduction to Coptic grammar and vocabulary, chiefly in the Sahidic dialect.

Copt 5002. Elementary Coptic. (3 cr; SP–5001 or equiv)
Reading a variety of Coptic literature, such as Gnostic, martyrological, or monastic texts.

Cultural Studies and Comparative Literature (CSCL)

Department of Cultural Studies and Comparative Literature
College of Liberal Arts

CSCL 1001. Introduction to Cultural Studies: Rhetoric, Power, Desire. (4 cr)
Ways of reading texts, artistic forms, everyday practices that define ongoing conflicts over meaning, value, truth. Examples from visual arts, music, film, literature, myth, ritual, built environment.

CSCL 1101W. Literature. (4 cr)
Introduction to literature across time, national boundaries. Basic genres, including poetry, novel, drama, historical/philosophical writing. Key questions: What is literature? What forms does it take? Why does literature matter?

CSCL 1201W. Visual Culture. (4 cr)
Introduction to role of visual practices. Film, photography, advertising, video/TV, public spectacle, new media (digital, virtual, hypertext), built environment in cultures past/present. American-worldwide. How does the visual articulate identity, family, community, sexuality, status, race, gender, ethnicity, nation?

CSCL 1301W. Reading Culture: Theory and Practice. (4 cr)
How can we understand the concepts of culture, cultural conflict? Emphasizes practice in reading cultural theory. Texts such as film, literature, music, fashion, commercial art, built environment.

CSCL 1401W. Reading Literature: Theory and Practice. (4 cr)
How can we read/understand different ways that literature is meaningful? Emphasizes practice in reading a broad spectrum of world literature, literary theory.

CSCL 1501W. Reading History: Theory and Practice. (4 cr)
What is history? How can we understand its meanings/uses? Emphasizes practice in reading cultural texts from various historical perspectives.

CSCL 1905. Freshman Seminar. (3 cr; SP–Fr or no more than 36 cr; A-F only)
Topics specified in Class Schedule.

CSCL 1907W. Freshman Seminar. (3 cr; SP–Fr or no more than 36 cr; A-F only)
Topics specified in Class Schedule.

CSCL 1910W. Freshman Seminar. (3 cr [max 6 cr]; SP–Fr or no more than 36 cr; A-F only)
Topics specified in Class Schedule.

CSCL 1912W. Introduction to Film Study. (4 cr; SP–[ARTH 1921]
Fundamentals of film analysis, major theories of cinema. Detailed interpretations of representative films from international history of cinema.

CSCL 3000. Topics. (1 cr [max 2 cr])
Selected topics.

CSCL 3115. Cinema and Ideology. (4 cr)
The cinema as a social institution with emphasis on the complex relations it maintains with the ideological practices that define both the form and the content of its products. Specific films used to study how mass culture contributes to the process of shaping beliefs and identities of citizens.

CSCL 3172. Music as Discourse. (3 cr)
Close examination of widely varying musical forms and styles, “classical” and “popular,” in relation to human subjectivity and configurations of culture, ideology, and power.

CSCL 3173W. The Rhetoric of Everyday Life. (3 cr)
How discourse reproduces consciousness and persuades us to accept that consciousness and the power supporting it. Literary language, advertising, electronic media; film, visual and musical arts, built environment and performance. Techniques for analyzing language, material culture, and performance.

CSCL 3174. Poetry as Cultural Critique. (3 cr)
Examines the status of “poetry” in several cultures of the Americas bringing together techniques of close reading and broad cultural inquiry.

CSCL 3175. Comedy: Text and Theory. (3 cr)
Comic forms (jokes, camp and ethnic humor, classic drama, TV sitcom, film) examined in relation to a broad spectrum of theory concerning the nature, mechanics, and uses of comedy in society.

CSCL 3176. Oppositional Cinemas. (4 cr)
The ways diverse national cinemas engage the international hegemony of Hollywood cinema. The cinematic struggle against cultural imperialism and the role of race, class, and gender in the domain of international cultural politics.

CSCL 3321W. Theories of Culture. (3 cr)
Examination of three prevalent theoretical perspectives on culture — philosophical, anthropological, and aesthetic — as they converge in the work of writers who have contributed to our contemporary conception of cultural diversity.

CSCL 3331. Science and the Humanities. (3 cr)
The sciences and humanities battle over “truth” and “reality,” while technology recasts the world of knowledge and work. The question of texts-as-truth also facilitates the ongoing religious attacks on science in this millennial moment.

CSCL 3361. Visions of Nature: The Natural World and Political Thought. (4 cr; SP–[EEB 3361]
Theories about organization of nature, human nature, and their significance for development of ethics, religion, political economy, civics, and environmentalism in Western/other civilizations. Lecture/discussion, film assignments.

CSCL 3366W. Nature, Landscape, and Ideology: 1600-1875. (3 cr)

CSCL 3421W. Psychoanalysis and Literature Part I: The Essential Freud. (3 cr)
Theoretical writings of Sigmund Freud; basic concepts of psychoanalytic criticism; dream and interpretation; genre of the case study; Freud’s ideas concerning the constitution of ethnicity, culture, identity, and gender; fantasy vs. reality: psychoanalysis of the author/character/culture.

CSCL 3421W. Culture and the Production of Modern Identity: 1600-1900. (3 cr)
History of cultural, personal and/or conceptual changes in Western societies, 1600 to 1750, concerning new and conflicting understandings of the human imagination, subjectivity, identity, and the body; addressed through philosophy, literature, visual arts, music, pedagogical and medical treatises, and manners.

CSCL 3422W. Culture and the Production of Modern Identity II: 1750-1900. (3 cr)
History of cultural, personal and/or conceptual changes in Western societies, 1750 to 1900, concerning new and conflicting understandings of the human imagination, subjectivity, identity, and the body; addressed through philosophy, literature, visual arts, music, pedagogical and medical treatises, and manners.

CSCL 3456W. Sexuality - From Perversion to Diversity. (3 cr)
Historical and critical study of forms of modern sexuality (heterosexuality, homosexuality, romance, erotic domination, lynching). How discourses constitute and regulate sexuality. Materials include scientific and scholarly literature, religious documents, fiction, personal narratives, films, advertisements.

CSCL 3458W. The Body and the Politics of Representation. (3 cr)
Western representation of the human body, 1500 to present. Body’s appearance as a site and sight for production of social and cultural difference (race, ethnicity, class, gender). Visual arts, literature, music, medical treatises, courtesy literature, erotica.

CSCL 3472. Gay Men and Homophobia in American Culture. (3 cr)
The historical experience of gay men, the social construction of same-sex desire in American society since 1700, studied in a broad context of cultural history and discourse, including literature and the arts, journalism, science and medicine, religion, and law.

CSCL 3631. Jewish Writers and Rebels in German, Austrian, and American Culture. (3 cr; SP–§Ger 3631, §Ws 3631 [no knowledge of German required; cr toward major or minor requires reading in German])
Literary/cultural modes of writing used by Jewish writers in Germany, Austria, and America to deal with problems of identity, anti-Semitism, and assimilation. Focus on 20th century. All readings (novels, poetry, stories) in English.

CSCL 3910. Topics in Cultural Studies and Comparative Literature. (3 cr)
Topics specified in Class Schedule.

CSCL 3944H. Honors Thesis. (3 cr; SP–Candidate for [magna or summa] honors in CSCL, consent of CSCL honors adviser)
Magna or summa honors thesis.

CSCL 3979. Issues in Cultural Pluralism. (3 cr)
The politics of the person: is it our destiny and nature to be either king or slave (Aristotle) or are we all created equal (Jefferson)? How do we judge ourselves and others, as individuals and as groups? How do we justify our judgments and move toward greater equality?

CSCL 3990W. Senior Seminar and Workshop. (3 cr [max 3 cr])
Student-defined, faculty-assisted collective research project devoted to the comparative, sociohistorical analysis of discursive practices and cultural artifacts. Limited to CSCL majors, this seminar/workshop offers an opportunity to apply skills and knowledge gained in previous classes, and to develop skills in research, critique, and presentation.

CSCL 5147. Teaching as Dialogue. (3 cr)
Teaching and the teacher are the subject. Entering into dialogue is the method. Issues with the politics of teaching, the means of entering into dialogue, questions of judgment, and the idea of self-teaching as the goal of teaching.

CSCL 5154W. Theoretical Constructions of Space. (3 cr)
Inquiry into theories of space drawn from various disciplines including anthropology, architecture, geography, history, landscape design, philosophy, planning, and sociology. Focus on sociopolitical interests that are served and sustained; emphasis on opportunities and implications for personal identity.
Dnce 3302. Tap Technique 4. (1 cr; SP–3301 or #) Tap techniques and rhythm structures.

Dnce 3401. Dance History 1. (3 cr) History/theory of dance in varied forms and aspects. From origins of dance as movement-form, through early Renaissance. First half of a yearlong survey.

Dnce 3402. Dance History 2. (3 cr) History/theory of dance in varied forms/aspects. From development of ballet, through twentieth century modern dance. Second half of yearlong survey.

Dnce 3433. Articulate Body. (3 cr; SP–Dnce major or minor, #) Lectures and movement sessions in biodynamic considerations for optimal dance performance and metabolistic demands of dance.

Dnce 3488. Dance as Cultural Practice. (3 cr) Study of dance as art, ritual, social activity, and entertainment in selected cultures of Asia, Africa, Eastern Europe, the Middle East, and the Americas.

Dnce 3500. Topics in Dance. (1-2 cr [max 10 cr]) Topics specified in Class Schedule.

Dnce 3601. Dance Composition 1. (3 cr; SP–1020 or #, concurrent regis in a modern dance technique course.) Movement, vocabulary in relation to theme, space, time, energy, and body parts; solo, duet, and trio forms.

Dnce 3602. Dance Composition 2. (3 cr; SP–3601 or #, concurrent regis in a modern dance technique course) Movement, vocabulary in relation to theme, space, time, energy, and body parts; solo, duet, and trio forms.

Dnce 3700. Performance. (2 cr; SP–Concurrent regis in a technique class, audition, #) Creation or reconstruction of a dance theatre work under the direction of a guest artist or faculty member. Work is performed at the end of the rehearsal period.

Dnce 4443. Philosophy and Aesthetics. (2 cr; SP–1401) Major developments in Western philosophic thought on dance and dance theory from its beginnings to the present.

Dnce 4487. Ethnic Dance Traditions in American Society. (3 cr) Traditional dances as preserved and transformed by Native Americans, African-Americans, Latinos, Asian-Americans, and European-Americans in the United States. Interpretation of roles of dance in these cultures.

Dnce 4601. Dance Composition 3. (3 cr; SP–1020, concurrent regis in a modern dance technique course, #) Continuation of movement vocabulary through improvisation, analysis of form and structure, experimentation with tone and performance persona; effects of light/ costumes/text/props/music; development of larger ensemble works.


Dnce 4901. Senior Seminar. (1 cr [max 2 cr]; QP–Sr, Dnce or Th major; SP–Sr, [Dnce or Th major]; S-N only) Development of senior project under guidance of faculty. To complete course, students must register for 1 credit fall and 1 credit spring in same academic year.

Dnce 5010. Modern Dance Technique 7. (3 cr [max 6 cr]; SP–3020, A) Continuation of technical development. Performance range and style. Students study with various guest artists.

Dnce 5020. Modern Dance Technique 8. (3 cr [max 4 cr]; SP–5010, A) Continuation 5010 and modern technique. Performance range and style. Students study with various guest artists.


Dnce 5210. Jazz Technique 7. (1 cr [max 2 cr]; SP–3220, A) Continuation of jazz technique. Syncopation, performance projection, and specific jazz styles: swing, bebop, lyrical, funk, latin.

Dnce 5220. Jazz Technique 8. (1 cr [max 2 cr]; SP–5210, A) Continuation of 5210. Syncopation, performance projection, and specific jazz styles: swing, bebop, lyrical, funk, latin.

Dnce 5500. Topics in Dance. (1-2 cr [max 10 cr]) Topics specified in Class Schedule.

Dnce 5700. Performance. (2 cr [max 18 cr]; SP–Technique course, #) Technique, improvisation, choreography, music, design, and technical production as they relate to dance performance.

Dnce 5858. Teaching Dance. (4 cr; SP–1020, A or #) Methods, principles, and techniques of teaching dance.

Dnce 5970. Directed Studies. (1-4 cr [max 10 cr]; SP–#, A, #) Guided individual study.

Dan 1001. Beginning Danish. (4 cr) Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and the Danish culture.

Dan 1002. Beginning Danish. (4 cr; SP–1001) Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and the Danish culture.

Dan 1003. Intermediate Danish. (4 cr; SP–1002) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Dan 1004. Intermediate Danish. (4 cr; SP–1003) Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments.

Dan 3011. Advanced Danish. (4 cr; SP–Passing score on GPT) To help students achieve advanced proficiency in Danish. Discussion of fiction, film, journalistic and professional prose is complemented by grammar and vocabulary building exercises and a systematic review of oral and written modes of communication.

Dan 3012. Advanced Danish. (4 cr; SP–Passing score on GPT) Discussion of novels, short stories, plays, articles complemented by structural, stylistic, vocabulary building exercises.

Dan 4001. Beginning Danish. (2 cr; SP–§1001, passing score on GPT in another language or grad) Meets concurrently with Dan 1001; see Dan 1001 for course description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dan 4002. Beginning Danish. (2 cr; SP–§1002, passing score on GPT in another language or grad) Meets concurrently with Dan 1002; see Dan 1002 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dan 4003. Intermediate Danish. (2 cr; SP–§1003, passing score on GPT in another language or grad) Meets concurrently with Dan 1003; see Dan 1003 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dan 4004. Intermediate Danish. (2 cr; SP–§1004, passing score on GPT in another language or grad) Meets concurrently with Dan 1004; see Dan 1004 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dental Hygiene (DH)

Department of Preventive Sciences
School of Dentistry


DH 1191. Dental Hygiene Care Process. (6 cr; SP–§1190, A-F only) Assessment principles related to medical and oral health status, dental hygiene clinical procedures, and development of instrumentation and hypertension screening skills.

DH 1203. Dental Specialties. (2 cr; S-N only) Various dental specialties and the dental hygienist’s role in services provided.

DH 2111. Dental Anatomy. (2 cr; A-F only) All deciduous and permanent teeth, including tooth form, function and relationships to oral health. Calculcation, eruption and exfoliation patterns; ideal static occlusion, dental terminology, and tooth annotation systems. Lab experiences include identification and annotation of teeth and restoration, in wax, of portions of a typodont tooth.

DH 2112. The Dental Hygiene Care Process Clinical Application 1. (5 cr; A-F only) Dental hygiene care process, assessment principles related to medical and oral health status, dental hygiene clinical procedures, and development of instrumentation skills.

DH 2132. Head and Neck Anatomy. (1 cr; A-F only) Anatomical structures of the head and neck as they relate to the practice of dental hygiene.

DH 2191. Independent Study. (0-6 cr [max 6 cr]; S-N only) Individually arranged study, instruction, or research with faculty to meet student needs and interests.

DH 2211. Oral Histology and Embryology. (2 cr; A-F only) Study of the application of pathophysiology to specific organ systems and more extensively the mouth. Emphasis on the identification and management of selected oral conditions.

DH 2212. Dental Hygienist-Patient Relationship. (1 cr; A-F only) Oral hygiene techniques implemented through communication between patient and oral health care provider. Co-therapeutic problem solving.
DH 2221. Periodontology. (3 cr; A-F only)
Periodontal diseases; etiology, assessment and treatment. Clinical experience in debridement, root planing, and placing periodontal dressings.

DH 2222. The Dental Hygiene Care Process Clinical Application II. (1-4 cr; A-F only)

DH 2231. Cariology. (2 cr; A-F only)
Dental caries; etiology, pathology, and prevention.

DH 2232. General and Oral Pathology. (2 cr; A-F only)
Circulatory disturbances, inflammation, and tumors with emphasis on diseases affecting the oral cavity, dental caries, periodontal diseases, oral neoplasias, and similar problems.

DH 2235. Oral and Maxillofacial Radiology. (2 cr; A-F only)
General principles of radiography, radiation physics, dosimetry, biology, radiation protection, regulations and recent concepts of imaging.

DH 3111. Biomaterials for the Dental Hygienist. (3 cr; A-F only)
Physical, chemical, and mechanical properties; indications and contraindications for use; manipulation techniques; biological considerations of materials used in dentistry; dental specialties.

DH 3123. The Dental Hygiene Care Process Clinical Application III. (1-4 cr; A-F only)
Dental hygiene treatment planning, alternative instruments and advanced skills related to the implementation of dental hygiene care. Clinical experience in dental hygiene patient care and dental dietary counseling.

DH 3126. Oral and Maxillofacial Radiology Clinic I. (0 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 3131. Periodontology I. Lecture. (1 cr; A-F only)
Periodontal anatomy; physiology and etiology of periodontal diseases. Clinical, histopathological, and pathogenesis of gingivitis and periodontitis, as well as the role of genetics, tobacco use, and systemic diseases. Preventive and therapeutic procedures associated with diagnosis, prognosis, treatment planning and initial phase of periodontal therapy.

DH 3132. Applied Nutrition in Dental Hygiene Care. (2 cr; SP–S; A-F only)
Principles of diet and nutrition applied to dental hygiene patient care; skills in dental dietary counseling.

DH 3133. Pharmacology. (2 cr; SP–A; A-F only)
Principles of pharmacology, physical/chemical properties of drugs, modes of administration, therapeutic/adverse effects, drug actions/interactions.

DH 3134. Dental Hygiene Care for Special Needs Patients I. (2 cr; A-F only)
Knowledge, skills, and attitudes required for providing dental hygiene care for pediatric/orthodontic and geriatric patients and individuals with disabilities.

DH 3135. Oral and Maxillofacial Radiology: Theory, Principles, and Radiographic Analysis. (2 cr; A-F only)
Atomic radiations; characteristics, production, and control of radiographs; radiographic exposures; recent concepts; radiation biology, dosimetry, protection, and regulations. Discrepancies and technical errors in intraoral radiographs; radiographic anatomy; radiographic evidence of deviations from normal anatomical variations.

DH 3191. Independent Study. (0-4 cr; max 6 cr; S-N only)
Individually arranged study, instruction, or research with faculty to meet student needs and interests.

DH 3203. Dental Hygiene Care for Special Needs Patients II. (2 cr; A-F only)
Knowledge, skills, and attitudes required for providing dental hygiene care for pediatric/orthodontic and geriatric patients and individuals with disabilities.

DH 3211. Local Anesthesia and Pain Management. (2 cr; A-F only)

DH 3224. The Dental Hygiene Care Process Clinical Application IV. (1-4 cr; A-F only)

DH 3227. Oral and Maxillofacial Radiology Clinic II. (0 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 3231. Research Methods in Dental Hygiene. (3 cr; A-F only)
Develop skills in scientific method and analyzing research findings; emphasis on types of research, problem selection, hypothesis writing, research planning and design, data collection and measuring techniques, analysis and interpretation of data, and writing the research proposal.

DH 4125. The Dental Hygiene Care Process Clinical Application V. (1-6 cr; A-F only)
Adapt dental hygiene care process to meet preventive and treatment needs of traditional and special needs patients. Analyze patient preventive and treatment need through case presentation. Discuss community service, cultural diversity, and family violence issues as well as new products, techniques, and research.

DH 4128. Oral and Maxillofacial Radiology Clinic III. (0 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 4131. Epidemiology, Prevention, Dental Public Health, and Community Outreach. (3 cr; A-F only)
Epidemiological methods of investigation and patterns of oral diseases; scope and content of the specialty of dental public health; public health process as related to community service and family violence issues.

DH 4132. Ethics, Jurisprudence, and Principles of Practice. (2 cr; A-F only)
Career planning, team building, employment seeking, jurisprudence, and ethical decision making.

DH 4137. Patient Management IV (PCG). (1 cr; A-F only)
Small-group, cooperative learning setting integrates dental and dental hygiene students. Apply patient care skills taught in other courses. Focus is on communication skills, patient management, teamwork, collegiality, and practice philosophy.

DH 4191. Independent Study. (0-6 cr; max 6 cr; S-N only)
Individually arranged study, instruction, or research with faculty to meet student needs and interests.

DH 4226. The Dental Hygiene Care Process Clinical Application VI. (1-5 cr; A-F only)
Adapt dental hygiene care process to meet preventive and treatment needs of traditional and special needs patients. Analyze patient preventive and treatment need through case presentation. Discuss community service, cultural diversity, and family violence issues as well as new products, techniques, and research.

DH 4227. Advanced Dental Hygiene Clinical Experience I. (0-6 cr; S-N only)
Development of skills in sonics/ultrasonic scaling/assess, treatment planning, documentation, implementation/evaluation of dental hygiene care.

DH 4228. Advanced Dental Hygiene Clinical Experience II. (0-6 cr; S-N only)
Development of skills in sonics/ultrasonic scaling/assessment, treatment planning, documentation, implementation/evaluation of dental hygiene care.

DH 4229. Oral and Maxillofacial Radiology Clinic IV. (3 cr; A-F only)
Exposing patient radiographs, interpretation, panoramic and extraoral technique, and quality assurance procedures.

DH 4231. Periodontology III. Lecture. (1 cr; A-F only)
Clinical procedures associated with surgical phase of periodontal therapy. Emphasis on evaluation of periodontal treatment as well as the maintenance phase and the relationship between periodontics and other dentistry disciplines. Roles of clinical research in periodontics.

DH 4232. Community Outreach. (1 cr; S-N only)
Dental hygiene education in a variety of community settings.

DH 4233. Legislative, Social, Economic, and Practice Factors in Oral Health. (1-4 cr)
Current status and trends in dentistry in relation to health care promotion, regulation, and delivery and political and legislative process.

DH 4238. Patient Management IV (PCG). (1 cr; A-F only)
Small-group, cooperative learning setting integrates dental and dental hygiene students. Apply patient care skills taught in other courses. Focus is on communication skills, patient management, teamwork, collegiality, and practice philosophy.

DH 4292. Educational Philosophy and Program Planning. (1-4 cr)
Program planning based on self and faculty assessment; building knowledge and skills to become a self-directed and lifelong learner.

DH 4293. Directed Study. (1-4 cr)
Individual and/or group study on selected topics, and/or problems, with emphasis on selected readings and use of scientific literature. Arranged by student(s) and faculty member(s).

DH 4294. Directed Research. (1-4 cr)
Critical literature review and/or individual empirical research project leading to a written report, and/or intensive observation/participation in the clinical research center.

DH 4295. Information Technology. (1-4 cr)
Individual and/or group study; student(s) select courses/workshops based on individual needs and interests.

DH 4296. Special Topics. (1-4 cr)
Students select topics of current interest from continuing education or other courses based on individual needs.

DH 4297. Topics in Interdisciplinary Health Care. (1-4 cr)
Development of skills in sonics/ultrasonic scaling/assessment, treatment planning, documentation, implementation/evaluation of dental hygiene care.

DH 4298. Patient Management IV (PCG). (1 cr; A-F only)
Small-group, cooperative learning setting integrates dental and dental hygiene students. Apply patient care skills taught in other courses. Focus is on communication skills, patient management, teamwork, collegiality, and practice philosophy.

DH 4300. Field/Practice Externship. (1-4 cr)
Program planning based on self and faculty assessment; building knowledge and skills to become a self-directed and lifelong learner.

DH 4301. Community Education. (1-4 cr)
Individual and/or group study; student(s) select courses/workshops based on individual needs and interests.

DH 4302. Special Topics. (1-4 cr)
Students select topics of current interest from continuing education or other courses based on individual needs.

DH 4303. Topics in Interdisciplinary Health Care. (1-4 cr)
Development of skills in sonics/ultrasonic scaling/assessment, treatment planning, documentation, implementation/evaluation of dental hygiene care.

DH 4306. Patient Management IV (PCG). (1 cr; A-F only)
Small-group, cooperative learning setting integrates dental and dental hygiene students. Apply patient care skills taught in other courses. Focus is on communication skills, patient management, teamwork, collegiality, and practice philosophy.

DH 4308. Patient Management IV (PCG). (1 cr; A-F only)
Small-group, cooperative learning setting integrates dental and dental hygiene students. Apply patient care skills taught in other courses. Focus is on communication skills, patient management, teamwork, collegiality, and practice philosophy.

DH 4309. Selected Topics in Patient Education. (1-4 cr)
Program development and clinical application; student assesses, plans, implements, and evaluates a patient education program in a clinical setting.

DH 4310. Field/Practice Externship. (1-4 cr)
Clinical and/or community service externship completed on or off campus with diverse population.
Design, Housing, and Apparel (DHA)

Department of Design, Housing, and Apparel
College of Human Ecology

DHA 1101W. Introduction to Design Thinking. (4 cr; A-F only)
Theories/processes that underpin design thinking. Interactions between humans and their natural, social, and designed environments where purposeful design helps determine quality of interaction. Design professions.

DHA 1170. Special Topics in Design, Housing, and Apparel. (1-4 cr [max 16 cr]; A-F only)
In-depth investigation of specific topic, announced in advance.

DHA 1171. Freshman Seminar in Design, Housing, and Apparel. (1-3 cr; SP–Fr, A-F only)
Topic in design, housing, or apparel. Small-group seminar.

DHA 1201. Clothing Design, Merchandising, and the Consumer. (3 cr; F-A only)
An orientation to the apparel business covering the multiple steps in the process of creating and merchandising apparel, and the ethical positions reflected in decision making at each step.

DHA 1221. Clothing Assembly Fundamentals. (3 cr; A-F only)
Methods/applications of clothing assembly, from micro to macro perspective.

DHA 1311. Foundations I: Drawing and Design in Two and Three Dimensions. (4 cr; QP–DHA major or pre-major; SP–DHA major or pre-major; A-F only)
Introduction to design elements/principles in context of observational drawing. Integrative approach to two-dimensional design, three-dimensional design, and drawing. Broad conceptual framework for design exploration. Emphasizes perceptual aspects of visual forms.

DHA 1312. Foundations II: Color and Design in Two and Three Dimensions. (4 cr; QP–1323; SP–DHA major or premajor; A-F only)
Color theory and its application in two- and three-dimensional design. Emphasizes effective use of color by studying traditional color systems, perception, and interaction. Lectures, demonstrations, extensive studio work, critiques.

DHA 1315. Foundations III: The Graphic Studio. (4 cr; QP–[DHA major or pre-major] 1325; SP–[DHA major or pre-major] 1311 or 1312) or # A-F only)

DHA 1601. Interior Design Studio I. (4 cr; QP–DHA premajor; SP–DHA premajor; A-F only)
Introduction to theories used to solve interior design problems related to human behavior, the design process and communication skills required of the interior design profession.

DHA 1602. Interior Design Studio II. (4 cr; QP–# SP–[DHA pre-major], 1601 with grade of at least C-A-F only)
Introduction to interior design programming as method for understanding behaviors/requirements of humans in spaces. Use of color in three-dimensional environments. Developing communication skills. Problem-solving.

DHA 2213. Textile Analysis. (4 cr; A-F only)
Physical, chemical, and biological characteristics of fibers, yarns, textile structures, and finishes. Their effect on performance/appearance of textile products, including clothing, interior, and industrial textiles.

DHA 2214. Softlines Analysis. (3 cr; QP–3216; SP–1201, 2214; A-F only)
Physical characteristics of garment components related to function of total garment. Laboratory problems based on methods of analysis including visual inspection of garment quality, construction techniques, costing, labor, target consumer, and fit related to function, quality, and sizing.

DHA 2221. Clothing Design Studio I. (4 cr; QP–[1221 orpass sewing proficiency exam], 1323, 1328, DHA major or pre-major; SP–[1201 or pass sewing proficiency exam], 1221, 1311, 1312, DHA [major or pre-major]; A-F only)
Theories/methods in designing clothing for various user groups. Relation of a 2-dimensional pattern shape to a 3-dimensional body. Introduction to flat pattern draping.

DHA 2222. Clothing Design Studio II. (4 cr; QP–1231, 3211, DHA major; SP–2221, DHA major; pass portfolio review; A-F only)
Design process in developing clothing for a specific user group. Advanced principles/methods of developing patterns for the body, including advanced flat pattern, draping, fitting. Computer-aided design tools for illustration, patternmaking.

DHA 2311. Drawing and Illustration. (3 cr; QP–1323, 1325, 1328, DHA [major or pre-major]; SP–1311, 1312, [DHA major or pre-major]; A-F only)
Advanced drawing skills. Introduces illustration concepts/techniques. Illustration assignments for concepts, stories, ideas integrate design elements/principles.

DHA 2334. Computer Applications I: Digital Composition. (3 cr; QP–[DHA major or pre-major] 1301, 1334, SP–[DHA major or pre-major] 1311, 1312, 1315; A-F only)
Composition of visual elements in electronic realm. Use of computer to design for traditional media, computer-generated environments.

DHA 2345. Typographic Design. (3 cr; QP–DHA major, pass portfolio review; SP–DHA major, pass portfolio review; A-F only)
History of typographic forms, principles of composition, expressive potential of type. Design process from problem-solving through exploration, experimentation, selection, critique, and refinement. Readings, research, exercises, design production.

DHA 2351. Graphic Design I: Text and Image. (3 cr; QP–3350, DHA major, pass portfolio review; SP–2345, DHA major, pass portfolio review; A-F only)
Composition of visual information using grid structures to integrate text/image. Informational/expressive aspects of graphic design, hierarchical relationships of elements. Methods of text layout that enhance communication.

DHA 2385W. Design and Factors of Human Perception. (4 cr; QP–M major, pass portfolio review; SP–Major, pass portfolio review; A-F only)
Introduction to the variables of design. Color perception, type legibility, and other aspects of the human interface with designed objects are investigated. Students develop design prototypes and learn methods to evaluate the effectiveness of designed projects.

DHA 2401. Introduction to Housing. (3 cr; QP–1101; SP–1101 or # A-F only)
Physical, social, economic, psychological aspects of housing design/construction. Housing as process/product in context of the individual, the family, the community. Effects of federal, state, local governmental policies, economic trends.

DHA 2402. Residential Technology. (3 cr; QP–1101; SP–1101 or # A-F only)
Survey of technology systems in housing with emphasis on the consumption and conservation of natural resources and energy sources, and human factor considerations in kitchen design.

DHA 2463. Housing and Community. (3 cr; QP–1101; SP–1101 or #1101; A-F only)
Examine the meaning and significance of neighborhood and community, the process of residential neighborhood change, and the impact of housing on neighborhood conditions. Topics include gentrification, displacement, racial segregation, suburbanization, and community-based revitalization.

DHA 2603. Interior Design Studio III. (4 cr; QP–Pass portfolio review, DHA major; SP–1602 with grade of at least C, pass portfolio review, DHA major; A-F only)
Expanding presentation skills, visual communication of design process. Design of interior environment as influenced by neighborhood, adjacent structures, regional context, diverse cultures.

DHA 2604. Interior Design Studio IV. (4 cr; QP–# SP–DHA major; 2603 with grade of at least C-A-F only)
Relationship between exterior/interior design as it pertains to building construction. Methods/materials, principles of structure, mechanical systems. Using 3-D CAD to integrate design concept with interior architectural components, systems, details.

DHA 2612. Interior Materials and Life Safety. (4 cr; QP–Pass portfolio review, DHA major; SP–Pass portfolio review, DHA major; A-F only)

DHA 2613. Lighting Design and Building Systems. (4 cr; QP–[DHA major, pass portfolio review] or # SP–[DHA major, pass portfolio review] or # A-F only)
Elements/principles of design merged with functional/aesthetic/human aspects of lighting. Application of types of lighting technology to solve design problems for interior spaces. Interfaces of electrical, HVAC, and plumbing systems in buildings.

DHA 2621. Computer Aided Design: Interior Design. (4 cr; QP–[DHA major, pass portfolio review] or # SP–[DHA major, pass portfolio review] or # A-F only)
Application of two- and three-dimensional computer drawing in design/visualization of interior space. AutoCAD software used on Windows-based system.

DHA 3217. Fashion: Trends and Visual Analysis. (3 cr; QP–2315, 2316; SP–2313, 2214; A-F only)
Relation of fashion trends to visual analysis of apparel. Application to design/retail.

DHA 3223. Clothing Design Studio III. (4 cr; QP–DHA major; 3211, 3218; pass portfolio review; SP–DHA major, pass portfolio review; A-F only)
Study tailored/non-tailored clothing structures. Experiment with various materials/structures applied to series of garments.

DHA 3224. Clothing Design Studio IV. (4 cr; QP–3211, 3232, 5218; pass portfolio review; SP–DHA major; A-F only)
Principles/theory of functional clothing design. Conduct/apply research in designing clothing for situations requiring thermal or impact protection, accommodation for mobility, or facilitation for bodily function.

DHA 3245. Nonstore Retailing. (3 cr; QP–1211; SP–1201; A-F only)
An overview of nonstore retailing practices that utilize selling strategies other than those found in store formats.

DHA 3312. Color and Form in Surface Design. (3 cr; QP–DHA major, pass portfolio review; SP–DHA major, pass portfolio review; A-F only)
Use of color/form representation in two-dimensional surface applications. Emphasizes historical use of color, spatial representation in visual communication.

DHA 3332. Graphic Design II: Identity and Symbols. (3 cr; QP–3351, pass portfolio review, DHA major; SP–2345, 2351, $3353, pass portfolio review, DHA major; A-F only)
Representation of abstract ideas through symbols. Development of visual identity systems.

DHA 3333. Graphic Design III: Packaging and Display. (3 cr; QP–3352, pass portfolio review, DHA major; SP–2345, 2351, 3352, $3353, pass portfolio review, DHA major; A-F only)
Application of graphic design principles to three-dimensional projects. Principles of three-dimensional design/space applied to labeling/packaging.
Course Descriptions

DHA 3605. Interior Design Studio V. (4 cr; QP–
SP–2604 with grade of at least C, DHA major; A-F only) Advanced interior design projects dealing with small to medium scale spaces. Emphasizes special-needs populations.

DHA 3606. Interior Design Studio VI. (4 cr; QP–
SP–3605 with grade of at least C, DHA major; A-F only) Advanced interior design projects dealing with large scale spaces or environmental concerns.

DHA 3614. Interior Design Ethics and Professional Practice. (4 cr; QP–Pass portfolio review; SP–2604, pass portfolio review; A-F only) The business of interior design, professional ethics, and responsible design are emphasized. Students investigate the interdependency between their business, clients, colleagues, and the community at large. Professional portfolios and credentials will be discussed.

DHA 4001. Design Minor Seminar. (1 cr; SP–Design minor; A-F only) Students share ideas/conclusions with one another, create a summary statement (e.g., document, multimedia display, designed object) of a significant learning insight.

DHA 4121. History of Costume. (4 cr; QP–General art history course; SP–General art history course; A-F only) Survey of clothing and appearance in Western cultures from pre-history to present. Role of gender, race, and class with respect to changes in dress within historical and social contexts. Research approaches and methods in the study and interpretation of dress.

DHA 4131. History of Visual Communication. (4 cr; QP–Intro history or art history course; SP–Intro history or art history course; A-F only) Historical analysis of visual communication with an emphasis on the technological, cultural, and aesthetic influences on graphic design. Examination of how historical events are communicated and perceived through graphic communication and imagery.

DHA 4161. History of Interiors and Furnishings: Ancient to 1750. (4 cr; QP–Arch history course or #; SP–Arch history course or #; A-F only) Study of European and American interiors and furnishings including furniture, textiles, and decorative objects.

DHA 4162. History of Interiors and Furnishings: 1750 to Present. (4 cr; QP–SP–4161 or # if A-F only) Study of European and American interiors and furnishings including furniture, textiles, and decorative objects.

DHA 4196. Internship in DHA. (1-4 cr; QP–Completion of at least one-half of professional sequence, plan submitted and approved in advance by adviser and internship supervisor, letter consent of faculty supervisor, #; SP–Completion of at least one-half of professional sequence, plan submitted and approved in advance by adviser and internship supervisor, letter consent of faculty supervisor, #; S-N only) Supervised work experience relating activity in business, industry, or government to the student’s area of study. Integrate your project or paper may be required.

DHA 4221W. Dress, Society, and Culture. (4 cr; QP–(1101, jr) or grad student; SP–(1101, jr) or grad student; A-F only) Considers dress from diverse cultures within/ outside USA analyzed using social science concepts. Dress as a nonverbal communication system.

DHA 4251. Product Development: Softlines. (4 cr; QP–
[3215, 3216] or grad; SP–[2213, 2214] or grad; A-F only) Product development for apparel, other sewn products. Emphasizes quality, design for production, effectiveness/reliability, quality specifications, conducting tests, interpreting results, inspection, acceptance sampling, vendor relations.

DHA 4217. International Developments in Textiles and Apparel. (4 cr; QP–[1201, grad; A-F only) Production, labor, trade, and marketing in textile, apparel, and related goods in global setting.

DHA 4225. Clothing Design Studio V. (4 cr; QP–5231, DHA major; SP–3224, DHA major; A-F only) Market research, design development and implementation. Designing for specific audience, market, user group. Applying market research to design line of clothing. Research of promotional methods for design project.

DHA 4226. Clothing Design Studio VI. (4 cr; QP–5231, DHA major; SP–4225, DHA major; A-F only) Synthesis of final work and focus on concepts examined in previous studio classes. Principles of mass production applied to design projects completed in 4225. Implementation of public promotion of a clothing line. Professional strategies for promoting career goals. Exhibition/portfolio presentations.

DHA 4241. Retail Promotion. (3 cr; QP–1211, [Mktg 3000 or equiv]; SP–1210, [Mktg 3001 or equiv]; A-F only) Integration of communication/consumer behavior theories with elements of retail promotion. Advertising, sales promotions, point-of-purchase communications, personal selling.

DHA 4242. Retail Buying. (3 cr; QP–1211, SP–1201, A-F only) Principles and mathematics of merchandise inventory control and the merchandise selection process.

DHA 4320. Surface Fabric Design Workshop. (4 cr [max 8 cr; A-F only] Studio experience in the production and development of surface design. Screen printing, batik, resist dying, shibori, cyanotypes, and dye transfers are included.

DHA 4334. Computer Applications II: Design for the Digital Environment. (3 cr; QP–DHA major; pass portfolio review; SP–2334 or # DHA major, pass portfolio review; A-F only) Build on skills developed in DHA 2334 while focusing on design of visual communication for electronic environments. Develop skills in the use of software to manipulate and create digital images and animation. Sound and video input will be combined with graphic imagery.

DHA 4340. Woven, Knit, and Non-Woven Fiber Design Workshop. (4 cr [max 8 cr; A-F only] Studio experiences in the development and production of woven, knit, and non-woven fiber projects. Explore several design methods and complete a major project using one of the design techniques.

DHA 4345. Advanced Typographic Design. (4 cr; QP–DHA major; pass portfolio review; SP–2345, 2351, #3334, DHA major, pass portfolio review; A-F only) Further exploration of expressive visual communication. Conceptual legibility of ‘the invisible art,’ overt expression through type. Students complete an extended typographic project.

DHA 4351. Design Process: Photography. (3 cr; QP–DHA major, pass portfolio review; SP–DHA major, pass portfolio review; A-F only) Relationship between photography, design projects. Composition, developing of film, printing.


DHA 4354. Graphic Design IV: Integrative Campaign. (4 cr; QP–3352, DHA major, pass portfolio review; SP–3353, DHA major, pass portfolio review; A-F only) Focus on a multi-faceted graphic communication campaign involving substantial investigation and concept development. The project will support a unified concept for an identified client that is aimed at reaching a target audience.

DHA 4355. Graphic Design Portfolio. (2 cr; QP–3353, DHA major, pass portfolio review; SP–4354, #4365, DHA major, pass portfolio review; S-N only) Preparation of professional portfolio. Discussion of professional issues.

DHA 4365W. Graphic Design Senior Seminar. (4 cr; QP–3353, DHA major, pass portfolio review; SP–4354, DHA major, pass portfolio review; A-F only) This capstone class gives students the opportunity to complete a senior research and design project that demonstrates understanding and ability in the social, conceptual, and technical aspects of design.

DHA 4384. Interactive Media. (3 cr; QP–5334 or # DHA major; pass portfolio review; SP–4334 or # DHA major, pass portfolio review; A-F only) Design of interactive multimedia projects. Experience developing interactive presentations and electronic publishing. Software includes hypermedia, scripting, video and sound editing, animation, digital output.

DHA 4461. Multifamily Housing Management. (4 cr; QP–1201, 2402, 2463 or # A-F only) Multifamily housing development, management approaches, psychosocial impact of housing/community design. Management issues with specific populations (e.g., elderly, families with children). Students conduct post-occupancy evaluation of a housing complex.

DHA 4465. Housing in a Global Perspective. (3 cr; QP–3463: SP–[2401, 2463] or # A-F only) Housing, its relationship to global patterns of social/ economic development. Three dimensional model of comparative framework. Emphasizes housing low income populations in rapidly growing cities of developing countries.

DHA 4482. Residential Environmental Quality. (3 cr; QP–1401 or # SP–2402 or # A-F only) Analysis of the residential environment and factors contributing to the degradation of environmental quality and human health. Relationship between residential environment and human health and their influences on environmental quality in housing.

DHA 4607. Interior Design Studio VII. (4 cr; QP–SP–3606 with grade of at least C, 3614, DHA major; A-F only) Sense of place. Contribution of artifacts to interior environments. Historic precedent, adaptive use, renovation, unconventional design projects.

DHA 4608W. Interior Design Thesis. (6 cr; QP–SP–4607 with grade of at least C, DHA major; A-F only) Current issues that affect interior design research/ practice. Methods for programming/solutions. Comprehensive independent interior design project developed from student-conducted research.

DHA 5111. History of Decorative Arts. (4 cr; QP–General art history survey course or #; SP–General art history survey course or #; A-F only) In depth study of textiles, ceramics, metal, and glass from selected historical periods. Focus on the Goldstein Gallery collections.

DHA 5170. Special Topics in Design, Housing, and Apparel. (1-4 cr max 8 cr) QP–Depends on topic, check with dept; SP–Depends on topic, check with dept; A-F only) In-depth investigation of a single specific topic, announced in advance.

DHA 5193. Directed Study in Design, Housing, and Apparel. (1-4 cr; QP–SP–#; A-F only) Independent study in design, housing, and apparel under tutorial guidance.

DHA 5196. Field Study: National/International. (1-10 cr max 10 cr) QP–SP–# A-F only) Faculty-directed field study in a national or international setting.

DHA 5216. Textile and Apparel Consumer. (3 cr; QP–3216 or # SP–1201, 2121 or # A-F only) Consumer actions concerning shopping and clothing products for home (and other physical interiors) and personal use as a part of daily living in different social, economic, and cultural settings, nationally and internationally.

DHA 5381. Digital Illustration. (3 cr; QP–5334, DHA major; SP–4334, DHA major; A-F only) Integration of design knowledge with computer applications. Use of raster/vector-based programs for illustration.

DHA 5382. Digital Sound and Video. (3 cr; QP–[5334, DHA major] or # SP–[4334, # DHA major; A-F only] Design solutions involving time-based media. Emphasizes sound/video. Electronic publishing via the internet.

DHA 5383. Modeling and Animation. (3 cr; QP–[5334, DHA major] or # SP–[4334, DHA major] or # A-F only) Three dimensional modeling/animation in electronic design communication.
DHA 5385. Internet-Based Media. (3 cr; QP–[5334, DHA major] or #; SP–[4334, DHA major] or #; A-F only)

DHA 5388. Design Planning, Analysis, and Evaluation. (3 cr; QP–[5335, DHA major] or grad or #; SP–[4354, DHA major] or grad or #; A-F only)
Preparatory work, including theoretical, applied, and legal aspects. Planning/design models. Design prototyping, testing, and analysis.

DHA 5399W. Theory of Electronic Design. (3 cr; QP–[DHA major, sr] or grad or #; SP–[DHA major, sr] or grad student or # offered alternate yrs; A-F only)
Theories, methodologies, histories of electronic design, its impact on visual communications. Digital artifacts, processes, paradigms.

DHA 5463. Housing Policy. (3 cr; QP–[4363; SP–2401, 2463 or #; A-F only])
Explore the institutional and environmental settings that make up housing policy in the United States. Examine competing ideas about solving the nation's housing problems through public intervention in the market. Federal and local public sector responses to housing problems will be evaluated.

DHA 5467W. Housing and the Social Environment. (3 cr; QP–[5467; SP–2401 or #; A-F only])
Housing choices are explored in the context of the social environment with an emphasis on the special needs of the elderly, disabled, minorities, large families, female-headed households, and low-income households.

DHA 5481. Housing for the Elderly and Special Populations. (3 cr; QP–[1400 or #; SP–2401 or #; A-F only])
Introduction to the changing housing needs of individuals and families across the life span. Particular emphasis will be on housing needs of children, older adults, and persons with disabilities.

DHA 5484. Rural Housing Issues. (3 cr; QP–[3463; SP–2401, 2463 or #; A-F only])
Housing issues in nonmetropolitan areas. The housing concerns of specific rural populations (e.g., low-income, elderly persons, American Indians, migrant workers) are identified and compared with urban housing issues are made.

**Dutch (Dtch)**

**Department of German, Scandinavian, and Dutch College of Liberal Arts**

Dtch 1001. Beginning Dutch. (4 cr)
Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

Dtch 1002. Beginning Dutch. (4 cr; SP–1001)
Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and Dutch culture.

Dtch 1003. Intermediate Dutch. (4 cr; SP–1002)
Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments.

Dtch 1004. Intermediate Dutch. (4 cr; SP–1003)
Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments.

Dtch 3011. Conversation and Composition. (4 cr; SP–Passing score on GPT or #)
Further practice and refinement of spoken and written Dutch beyond the intermediate level; development of compositional skills and vocabulary based on the reading, viewing, and discussion of relevant Dutch and Flemish media reports. Grammar review and development of critical correct grammatical skills.

Dtch 3012. Conversation and Composition. (4 cr; SP–3011)
Further practice and refinement of spoken and written Dutch beyond the intermediate level; development of compositional skills and vocabulary based on the reading, viewing, and discussion of relevant Dutch and Flemish media reports. Grammar review and development of critical correct grammatical skills.

Dtch 3310. Studies in Dutch Literature. (3 cr [max 9 cr]; SP–Reading knowledge of Dutch)
In-depth study of authors or topics from various periods in Dutch literature (e.g., 19th-century Dutch novels, colonial novels, literature of Golden Age). All primary literature is read in the original.

Dtch 3510. Topics in Dutch Culture. (3 cr [max 9 cr]; SP–No knowledge of Dutch required)
A single topic or theme of Dutch or Flemish culture explored in depth. Past topics have included Dutch national origin, the novelist of the Batavian myth, and images of Dutchness.

Dtch 3610. Dutch Literature in Translation. (3 cr [max 9 cr]; SP–No knowledge of Dutch required)
In-depth study of authors or topics from various periods in Dutch literature. All primary/secondary literature is read in English translation.

Dtch 3993. Directed Studies. (1-5 cr [max 12 cr]; SP–#; A-F, Q)
Guided reading in or study of Dutch literature, culture, or advanced language skills.

Dtch 4001. Beginning Dutch. (2 cr; SP–§1001, passing score on GPT in another language or grad)
Meets concurrently with Dtch 1001; see Dtch 1001 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 4002. Beginning Dutch. (2 cr; SP–§1002, passing score on GPT in another language or grad)
Meets concurrently with Dtch 1002; see Dtch 1002 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 4003. Intermediate Dutch. (2 cr; SP–§1003, passing score on GPT in another language or grad)
Meets concurrently with Dtch 1003; see Dtch 1003 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 4004. Intermediate Dutch. (2 cr; SP–§1004, passing score on GPT in another language or grad)
Meets concurrently with Dtch 1004; see Dtch 1004 for description. This option is designed for students who have satisfied the GPT requirements in another language or are graduate students or are otherwise exempt.

Dtch 5490. Topics in Dutch Literature. (3 cr [max 9 cr]; SP–#)
Topics may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule.

Dtch 5741. Medieval and Early Modern Dutch. (3 cr)
Introduction to the linguistic aspects of medieval and early modern Dutch. Reading and analysis of representative literary texts from the Dutch Middle Ages to 1700.

Dtch 5993. Directed Studies. (1-4 cr [max 12 cr]; SP–#; A-F, Q)
Guided individual reading or study.

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**East Asian Studies (EAS)**

**Institute of International Studies College of Liberal Arts**

EAS 1462. Introduction to East Asia in Modern Times: 1600-2000. (4 cr)

EAS 3013. Introduction to East Asian Art. (3 cr; SP–#ArtH 3013)
A selective examination of representative works of art produced in China, Korea, and Japan from the neolithic era to modern times. Nearly every major type of object and all major styles are represented.

EAS 3211. Geography of East Asia. (3 cr; SP–#Geog 3211, #Geog 3211)
Physical and human geography of Japan, mainland China and Taiwan, North and South Korea; population pressure, economic and urban development, and international relations.

EAS 3461. Introduction to East Asia I: The Imperial Age. (4 cr; SP–§Hist 3461)
Comparative survey of early history of China, Japan, Korea, and Vietnam; early Chinese thought; diffusion of Confucianism, Buddhism, and other values throughout East Asia; political and social history of region to 1600.

EAS 3462. Introduction to East Asia in Modern Times: 1600–2000. (4 cr; SP–§Hist 3462)
Formation and decline of early modern Asian empires; Western imperialism and Asian nationalism; social revolution, economic modernization, and cultural change in China, Japan, Korea, and Vietnam between 1600–2000.

EAS 3464. China in the Song, Yuan, and Ming Dynasties. (3 cr; SP–§Hist 3464)
China during the Song (976–1279), Yuan (1279–1368) and Ming (1638–1644) dynasties, political institutions and social structures. Attention to primary sources and how historians ask and answer questions about the past.

EAS 3465W. China in the Ming and Qing Dynasties. (3 cr; SP–§Hist 3465)
The political and social history of China from about 1600 until the end of the Qing dynasty in 1911. Topics include ethnicity, daily life, legal structures, city life, and peasantry.

EAS 3467W. State and Revolution in Modern China. (3 cr; SP–§Hist 3467)
Modern China’s political evolution including the Taiping Rebellion, Republican Revolution, rise of Nationalist and Communist parties, Maoist era; reform under Deng Xiaping, and the emergence of democracy in Taiwan.

EAS 3468W. Social Change in Modern China. (3 cr; SP–§Hist 3468)
Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women’s movement; early industrialization; socialism and collectivization after 1949; industrialization of Taiwan; PRC’s entry into the world trading system.

EAS 3471. 20th-Century Japan: 1910s to 1990s. (3 cr; SP–§Hist 3471)
World War I, Japan’s emergence as an industrial society, world power in the 1920s. Rise of militarism, World War II in the Pacific. Political reform, economic resurgence, cultural change in postwar era.

EAS 3472. Early Modern Japan. (3 cr; SP–#Hist 3472)
Course Descriptions

EAS 3473. Family, School, and Work in Modern Japanese History. (3 cr; SP–§Hist 3473) Impact of economic change on males and females in the family, the education system, the employment system from the 17th through 20th centuries.

EAS 3474. The Rise of Modern Japan: 1850s to 1900s. (3 cr; SP–§Hist 3474; S-N only) The Meiji Revolution from Commodore Perry to the eve of World War I; origins of constitutional monarchy, industrial economy, Western influences, and modern cultural change.

EAS 3661. Japanese Society Today. (3 cr; SP–§Soc 3661; Soc 1001 or courses on East Asia or experience in East Asia or #) Major aspects of Japanese society. Forms of social relations and values, religion, childhood, family, community, education, work, business organization, political and social classes, crime and punishment, popular culture, status of women and minorities, social protest movements, and international relations.

EAS 3671. Contemporary Chinese Society: Mainland China, Hong Kong, Taiwan. (3 cr; SP–§Geo 3671; 5soc 3671; Geo 1301 or Soc 1001 or equiv in other social sciences or humanities or #A-F only) Chinese society and culture, with focus on post-1949 mainland China, Taiwan, and Hong Kong. Chinese family, dating and marriage, rural and urban societies, population, work and occupation, socioeconomic development and inequalities, and impacts of post-1978 reforms.

EAS 3940. Topics in Asian History. (1-4 cr [max 16 cr]; SP–# or #) Selected topics in Asian history not covered in regular courses.

EAS 4467. Politics and Market in Contemporary Japan. (3-4 cr; SP–§Pol 4467; Pol 1054 or 3051 or non-pol sci grad or #) Study how Japan combined rapid economic development and relative social stability in the postwar period and the problems Japan faces in today’s “globalized” world. Focus on major economic and political actions including bureaucracy, business and labor, and the role of political and economic institutions. Assess strengths and weakness of the Japanese-style of capitalism.

EAS 4473. Chinese Politics. (3-4 cr; SP–§Pol 4473) Focuses on fundamental conflicts in Chinese society; the political economy, human rights, class divisions, gender struggles, environmental issues, and capitalist vs. socialist development strategies. Secondary topics include Chinese foreign relations and domestic and foreign political issues in Taiwan.

EAS 4466. Comparative East Asian Development: A New Mode for Growth and Prosperity? (3-4 cr; SP–§Soc 4662; 3661 or Soc 3661 or related Asian or sociology courses or East Asian experience or #) Social and cultural reasons for the rapid growth and relative equity of Japan, South Korea, Taiwan, Hong Kong, Singapore and more recently, China. Relation of these examples to more general theories of development.

EAS 5940. Topics in Asian History. (1-4 cr [max 16 cr]; SP–Grad or #) Selected topics such as cultural, economic, intellectual, political, and social history.

Ecology, Evolution, and Behavior (EEB)

Department of Ecology, Evolution, and Behavior
college of Biological Sciences

EEB 1019. Our Changing Planet. (4 cr; SP–§Ast 1019; §Geo 1019) Interdisciplinary study of Earth as a set of interacting, evolving systems—solid earth, oceans, atmosphere, and biosphere—and its relationship with the sun and stars. Cycling of matter and energy in Earth systems, their equilibria, and the effect of natural and human perturbations.

EEB 3001. Ecology and Society. (3 cr; SP–# or #; not for biology majors; A-F only) Basic concepts in ecology; organization, development, and function of ecosystem; population growth and regulation. Human impact on ecosystems.

EEB 3361. Visions of Nature: The Natural World and Political Thought. (4 cr; QP–§Hist 3474; S-N only; biological sciences students may not apply these credits toward the major; SP–§Sci 3361; #Soph or # or #; biological sciences students may not apply these credits toward the major) Theories about the organization of nature, human nature, and their significance for the development of ethics, religion, political and economic philosophy, civics, and environmentalism in Western and other civilizations.

EEB 4002. Ecology of Minnesota. (2 cr; QP–College-level biology course; SP–College-level biology course; A-F only) Consideration of how ecological systems are structured, what is and is not done to and around them. Provides basis for understanding Minnesota’s ecosystems, and assists students in evaluating alternatives and making wise decisions regarding Minnesota’s ecosystems.


EEB 4016. Ecological Biogeography. (3 cr; QP–Biol 3008 or Biol 5041 or Biol 5941; EP 2021; SP–Biol 3407) Biotic regions of the world in general and North America in detail. Ecological principles of distribution, interpretations of regional and temporal patterns in distribution of vegetation, and taxonomic groups of plants and animals. Includes one weekend field trip.

EEB 4129. Mammalogy. (4 cr; QP–Biol 1106 or Biol 1806; SP–FW 4129; Biol 1001 or Biol 2012; A-F only) Study of animals in their environment based upon biochemical and biophysical principles.

EEB 4631. Global Ecology. (4 cr; QP–Geo 3202, Geo 3301; SP–Geo 4631; college-level ecology course, 2 semesters of [chemistry, high school physics] or #A-F only) Field study of human-induced global changes on the functioning of ecosystems.

EEB 4733W. Directed Studies: Writing Intensive. (1-7 cr [max 7 cr]; SP–#; A-F only; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only) Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Writing intensive.

EEB 4794W. Directed Research: Writing Intensive. (1-7 cr [max 15 cr]; SP–#; A-F only; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements; S-N only) Laboratory or field investigation of selected areas of research. Writing intensive.

EEB 4814. Plant Community Ecology. (4 cr; QP–Ecology course; SP–Ecology course; A-F only) Communities represented in Itasca Park and vicinity with emphasis on vegetation, patterns of distributions of communities, their interaction with environment and dynamic relationships, methods of community, and description and analysis.

EEB 4817. Vertebrate Ecology. (4 cr; QP–Ecology course; SP–Ecology course; A-F only) Field studies on vertebrate populations, their relationships to local environments, habitat analysis, and ecological research methods. Work individually or in teams to investigate the natural history and ecological aspects of selected vertebrates. Course supplemented with lectures and field trips.

EEB 4834. Field Ornithology. (4 cr; QP–§EEB 4314; general biology including study of zoology; SP–§EEB 4314; general biology including study of zoology; A-F only) Lab and field course in structure, classification, distribution, evolution, migration, habits, habitats, and identification of birds. Two weekend field trips.

EEB 4836. Ichthyology. (3 cr; QP–Biol 1106; SP–FW 4136; Biol 1001 or Biol 2012) Fish biology, adaptations to different environments and modes of living, and environmental relationships. Lab emphasizes anatomy and identification of Minnesota fishes.

EEB 4856. Ecological Animal Physiology. (2 cr; QP–Biol 3011; SP–Biol 3211, Biol 2005 or #) Functional adaptation of animals to their environment based upon biochemical and biophysical principles.
EEB 4842. Arctic Field Ecology. (4 cr; SP—Basic courses in ecology, organismal biology, approved application; A-F only) Arctic natural history/ecology explored via a four-week trip to Northwest Territories of Canada. Students travel by van, air, and inflatable canoes; design their own research projects; become familiar with ongoing studies in landscape/riparian ecology; learn field skills/techniques associated with ecological studies in Arctic regions; and work directly with local Inuit people about traditional ecological knowledge.

EEB 4993. Directed Studies. (1-7 cr; max 7 cr) SP—#; A-F only; max of 7 cr of 4993 or 4994 may count toward major requirements; S-N only) Individual study on selected topics or problems with emphasis on selected readings and use of scientific literature.

EEB 4994. Directed Research. (1-7 cr; max 7 cr) SP—#; A-F only; max of 7 cr of 4993 or 4994 may count toward major requirements; S-N only) Laboratory or field investigation of selected areas of research.

EEB 5008. Forest Response to Quaternary Climate Change. (2 cr; QP—Biol 5041 or 5441, SP—Biol 3407, EEB 4631 or Geo 4631, EEB 5009-A F only) Forest responses to past climate change at the population, community, and ecosystem level. Response to perturbations on human disturbance, range shifts and invasions. Limitations to the speed of response to rapid climate change.

EEB 5009. Quaternary Vegetation History and Climate. (2 cr; QP—5004 or Geo 5631 or SP—4631 or 4831 or #) Reconstructing and dating changes in vegetation and climate from Quaternary pollen stratigraphy of major world biomes; evidence from other indicators of past environments; comparison with climate models.

EEB 5011. Pollen Morphology. (2 cr; QP—Pbio 3201 or SP—Biol 3007, PBio 4321 or #) Morphology and nomenclature of pollen grains and pteridophyte spores, survey of pollen and spores of major plant families, lab techniques.

EEB 5013. Quaternary Plant Macrofossils. (2 cr; QP—Pbio 3201 or SP—Pbio 4321 or 4511 or #) Morphology of seeds, fruits, and other macroscopic remains likely to occur in Quaternary deposits, survey of fossils of major plant families, lab techniques.

EEB 5033. Population and Quantitative Genetics. (4 cr; QP—Biol 5003 or GCB 3022, course in biometry or statistics; SP—Biol 4003 or GCB 3022, Intro statistics or A-F only) Genetic basis of variation in populations and of evolutionary change: allelic frequency dynamics with emphasis on human genetic variation, additive genetic variance and heritability. Current topics related to the consequences of artificial selection and inbreeding.

EEB 5051. Analysis of Populations. (3 cr; QP—Intro biology, intro statistics or #; SP—Intro biology, intro statistics or #) Factors involved in the regulation, growth, and general dynamics of populations. Data needed to describe populations, population growth, population models, and regulatory mechanisms.

EEB 5053. Ecology: Theory and Concepts. (4 cr; QP—Biol 3008 or Biol 3407 or #) Classical and modern mathematical theories of population growth, interspecific interactions, ecosystem dynamics and functioning, with emphasis on underlying assumptions and on effects of added biological reality on robustness of predictions, stability, interspecific interactions, ecosystem structure and functioning.

EEB 5122W. Plant Interactions with Animals and Microbes. (4 cr; QP—Biol 3008, Biol 1106 or 1806 or 3011, Biol 1103 or Biol 2012 or 3812 10 cr bio sc; BP—Biol 2012 or 3002, 3407 or 3409; A-F only) Ecological and environmental implications of mutualistic and antagonistic interactions between plants, animals, microbes at organismal, population, and community levels.

EEB 5321. Evolution of Social Behavior. (3 cr; QP—3111; SP—Biol 3411 or # A-F only) Introduction to concepts and theories relating to behavior evolution, mating systems, and cooperative behavior in animals.

EEB 5322. Neural and Endocrine Mechanisms Underlying Vertebrate Behavior. (2 cr; QP—3111 or Biol 3011; SP—Biol 3411 or Biol 3101 or Nsc 3101 or Phnl 3101 or # A-F only) Selected aspects of the physiological basis of vertebrate behavior with emphasis on neural and endocrine integration and the effects of evolutionary pressures on it. Hormones and sex behavior, sensory perception, neurobiology of communication.

EEB 5327. Behavioral Ecology. (3 cr; QP—3111; SP—Biol 3411 or #) Evolutionary principles applied to aggressive competition, mate choice, cooperation, and parental investment. Optimization models used to examine foraging strategies, predator/prey interactions, and territoriality. Evolution of sex, sexual selection, dispersal. Evolutionary game theory.

EEB 5361. Visions of Nature: The Natural World and Political Thought. (4 cr; QP—Advanced studies in history, philosophy, or biology; SP—Advanced studies in history, philosophy, or biology) Theories about the organization of nature, human nature, and their significance for the development of ethics, religion, political and economic philosophy, civics, and environmentalism in Western and other civilizations. Graduate credit requires paper on conceptual topic per quarter.

EEB 5371. Principles of Systematics. (3 cr; QP—#; SP—#) Theoretical and practical procedures of biological systematic phylogeny reconstruction, including computer-assisted analyses, morphological and molecular approaches, species concepts and specification, comparative methods, classification, historical biogeography, nomenclature, and use and value of museums.

EEB 5961. Decision Analysis and Modeling in Conservation Biology. (3 cr; QP—Conservation biology grad; SP—Conservation biology grad or # A-F only) Active learning class explores decision analysis techniques and modeling in conservation biology. Introduces techniques, concepts, and software.

Economics (Econ)

Department of Economics

College of Liberal Arts

Econ 1101. Principles of Microeconomics. (4 cr; QP—§1002, §1005, §1104; knowledge of plane geometry and intermediate algebra at level of GC 0623 and GC 0631; A-F only) Aggregate consumption, saving, investment, and national income. Role of money, banking, and business cycles in the domestic and global economy. International trade, growth, and development. U.S. economy and its role in the world economy.

Econ 1102H. Honors Course: Principles of Microeconomics. (4 cr; QP—§1001, §1004, §1105; knowledge of plane geometry and intermediate algebra at level of GC 0623 and GC 0631; A-F only) Aggregate consumption, saving, investment, and national income. Money, banking, and business cycles in the domestic and global economy. International trade, growth, and development. Role of the United States in the world economy, international interdependencies. Emphasis on economic models to explain macroeconomic phenomena.

Econ 1104. Principles of Microeconomics. (4 cr; QP—§1002, §1105, §1110, §1111; 1 qtr calculus; SP—§1101, §1111; Math 1271) Microeconomic behavior of consumers, firms, and markets in the domestic and world economy. Demand and supply; competition and monopoly; distribution of income. Effects of economic interdependencies and global linkages on individual decisions. Use of calculus and mathematical models.


Econ 1905. Freshman Seminar. (3 cr; SP—F or no more than 36 cr; A-F only) Topics specified in Class Schedule.

Econ 3021. Survey of Economic Ideas. (3 cr; QP—§1101, §1102 or equiv; SP—§4022; 1101, 1102 or equiv, not for econ majors) A historical and analytical treatment of how important economic ideas developed over time, and their relationship to prevailing economic conditions and politics. Economic ideas from Adam Smith to the present.

Econ 3031. American Economic Problems. (3 cr; QP—§1101, §1102 or equiv; SP—not open to Econ majors; SP—§4031; 1101, 1102 or equiv, not for econ majors) American economic problems/relationships. Relevance of simple economic principles to economic problems in the United States.

Econ 3033. Current Economic Issues. (3 cr; max 6 cr; QP—§1101, §1102 or equiv; SP—§4033; 1101, 1102 or equiv, not for econ majors) Current controversies over economic policies used to deal with some economic problems. Students focus in part on a specific issue of their choice. Different economic issues are discussed each time the course is offered (every three years).

Econ 3041. Prospective World Economy. (3 cr; QP—§1101, §1102 or equiv; not open to Econ majors; SP—§4041; 1101, 1102 or equiv, not open to Econ majors) What economic future holds. What can be done about global issues. How to improve economic prospects of countries.

Econ 3101. Intermediate Macroeconomics. (4 cr; QP—§1101, §1102, §1103 or equiv; 1 qtr calculus; SP—§1305, §1311, §1101, §1102, §1104, Math 1271 or equiv) Behavior of households, firms, and industries under competitive and monopolistic conditions; factors influencing production, price, and other decisions of the firm; applications of the theory. Economic efficiency and distribution of well-being.
Course Descriptions

Econ 3101H. Honors Course: Intermediate Microeconomics. (4 cr; CP–1101, 1102 or equiv; 1 qtr calct; prereq #; SP–3101, 3105; 1101, 1102 or equiv; Math 1271 or equiv) Behavior of households, firms, and industries under competitive and monopolistic conditions; factors influencing production, price, and other decisions of the firm; application of the theory. Economic efficiency and distribution of well-being.

Econ 3102. Intermediate Macroeconomics. (4 cr; CP–3101 or equiv; SP–3112; 1101, 1102 or equiv; not open to Econ majors) Determinants of national income, employment, and price level; effects of monetary and fiscal policies; emphasis on a general equilibrium approach. Applications of the theory, especially to current macroeconomic policy issues.

Econ 3102H. Honors Course: Intermediate Macroeconomics. (4 cr; CP–3102; prereq 3101 or equiv; B avg recommended; SP–3101 or equiv) Determinants of national income, employment, and price level; effects of monetary and fiscal policies; emphasis on a general equilibrium approach. Applications of economic efficiency and distribution of well-being.

Econ 3105. Managerial Economics. (4 cr; CP–SP–3101, 3105; 1101, 1102 or equiv; not open to Econ majors) 1101, 1102 or equiv; SP–1101, 1102 or equiv; Math 1271 or equiv; SP–not open to Econ majors) Theory of the firm; managerial decision problems. Demand theory. Production technology and cost concepts. Pricing and output decisions under different market structures. Investment behavior. Government regulation.

Econ 3101. Labor Economics. (3 cr; CP–SP–3101, 3105; 1101, 1102 or equiv; not open to Econ majors; SP–1101, 1102 or equiv; not open to Econ majors) Theory of labor as a factor of production, population, and labor force; economics of labor markets; labor market institutions; theories of wages and employment; unions and collective bargaining; public policies.

Econ 3105. Macroeconomics. (4 cr; CP–SP–3041; 3101 or 3105 or #; SP–3041; 3102 or equiv) Types of economics, ethics and its economic applications, and bases of different economic philosophies. Topics vary by semester. Examples include relationships between freedoms and responsibilities; economics and ethics of the stakeholder concept; different concepts of property rights or justice.

Econ 4022. Survey of Economic Ideas. (3 cr; CP–3021, 3101; SP–3021, 3101, 3102 or equiv) Historical and analytical view of how important economic ideas developed and their relationship to prevailing economic conditions and policies. Economic ideas and the role of government.

Econ 4031. American Economic Problems. (3 cr; CP–SP–3031, 3101 or 3105 or # or SP–3031, 3101 or 3102 or equiv) Discussion of American economic problems and relationships. Relevance of simple economic principles to economic problems in the United States.

Econ 4033. Current Economic Issues. (3 cr [max 6 cr]; CP–3033; 3101 or 3105 or # or SP–3033; 3101, 3102 or equiv) Current controversies over economic policies used deal with some economic problems. Students focus in part on a specific issue. Different economic issues are discussed every time the course is offered (every three years).

Econ 4041. The Prospective World Economy. (3 cr; CP–SP–3041; 3101 or 3105 or # or SP–3041; 3102 or equiv) Considers what the economic future holds, what can be done now to deal with global issues, and how to improve economic prospects of countries.

Econ 4109H. Honors Course: Game Theory and Applications. (4 cr; CP–3101, 3102, 3103 or equiv; Math 1251-1252-1261; SP–3101, 3102 or equiv; Math 1271-1272 or equiv) Games; normal form and extensive form; wars of attrition; games of timing; bargaining applications in industrial organization, macroeconomics, and international economics.

Econ 4113. Introduction to Mathematical Economics. (4 cr; CP–3101, 3102, 3103 or equiv; Math 1251-1252-1261 or equiv; SP–3101, 3102 or equiv; Math 1271-1272-2243 or equiv) Development of selected models of economic behavior in mathematical terms. Topics selected to illustrate the advantages of a mathematical formulation.

Econ 4161. Microeconomic Analysis. (2 cr; CP–3103, Math 2251-2252 or equiv; Econ 5113 recommended; SP–3101 or 5151 or equiv Math 2243; Math 2260) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty, and game theory. This 7-week course meets with 8001.

Econ 4162. Microeconomic Analysis. (2 cr; CP–5161; SP–4161) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty, and game theory. This 7-week course meets with 8002.

Econ 4163. Microeconomic Analysis. (2 cr; CP–5162; SP–4162) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 8003.

Econ 4164. Microeconomic Analysis. (2 cr; CP–SP–4163) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. May include topics such as externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 8004.

Econ 4165. Macroeconomic Theory. (2 cr; CP–3102, 3103 Math 3251-3252 or equiv; SP–5113 recommended; SP–3102, Math 2243, Math 2263 or equiv or #) Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, and prices. This seven-week course meets with 8005.

Econ 4166. Macroeconomic Theory. (2 cr; CP–5164; SP–4165) Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, and prices. This seven-week course meets with 8106.

Econ 4171. History of Economic Thought. (3 cr; CP–3101, 3102, 3103 or equiv; SP–3101, 3102 or equiv) Primarily a critical reading course. Topics include Smith, Ricardo, Malthus, and Marx; neoclassics, Keynes, the mercantilist and physiocratic doctrines; and modern theory.

Econ 4211. Principles of Econometrics. (4 cr; CP–3231, 5231 [1101, 1102 or equiv], one qtr calct; Stat 3011, Stat 3012, 3013, or Stat 5071-5161 for computers; SP–[1101, 1102 or equiv], Math 2243 or equiv. [Stat 3021, Stat 3022] or equiv. [Stat 3021, Stat 3022 or equiv] [Stat 3011, Stat 3012]; Math 2242 strongly recommended; A-F only) Review of basic linear regression model, its variants. Time series/simultaneous equation models. Material may include panel data, censored/truncated regressions, discrete choice models.

Econ 4262. Introduction to Econometrics. (4 cr; CP–SP–5261; SP–4261; A-F only) Review of basic linear regression model, its variants. Time series/simultaneous equation models. Material may include panel data, censored/truncated regressions, discrete choice models.

Econ 4301W. Economic Development. (3 cr; CP–5331; 1101, 1102 or equiv; not open to Econ majors; SP–5433; 1101, 1102 or equiv; not open to Econ majors) Economic growth in low income countries. Theory of aggregate and per capita income growth. Population growth, productivity increases, and capital formation. Allocation of resources between consumption and investment and among sectors. International assistance and trade.
Course Descriptions

Econ 5821. Public Economics. (3 cr; OP–[3301; 3101, 3103 or equiv]; SP–[3301; 3101, 3102 or equiv])

Comparing views on the proper role of government in the economy. Effects of tax and spending policies, taking into account private agents’ response to government actions and the way government officials may use their powers; optimal policies. Applications primarily to U.S. government.

Education and Human Development (EdHD)

College of Education and Human Development

EdHD 1901. Freshman Seminar, Environment. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1902. Freshman Seminar, Cultural Diversity. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1903. Freshman Seminar, Citizenship/Public Ethics. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1904. Freshman Seminar, International Perspectives. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1905. Freshman Seminar. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1906W. Freshman Seminar, Environment and Writing Intensive. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1907W. Freshman Seminar, Cultural Diversity and Writing Intensive. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1908W. Freshman Seminar, Citizenship/Public Ethics and Writing Intensive. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1909W. Freshman Seminar, International Perspectives and Writing Intensive. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1910W. Freshman Seminar, Writing Intensive. (1-3 cr; max 6 cr; SP–Fr)

Interdisciplinary seminar. Topics specified in Class Schedule.

EdHD 1901. Exploring the Teaching Profession. (1 cr; max 4 cr; OP–Early admit for init lic/Ed program; SP–Early admit for init lic/Ed program, AS-N only)

Self as teacher, the culture of teaching, students as learners, learning contexts, societal influences on teaching/schools.

EdHD 5001. Learning, Cognition, and Assessment in the Schools. (3 cr; OP–Ed/Ed/Ed/Ed; init lic student or CLA music ed or preteaching major or #; A-F only)

Principles of learning, cognition, cognitive development, classroom management, motivation, instruction, assessment. Approaches include behaviorism, cognitive and social constructivism, human information processing theory. Topics include intelligence, knowledge acquisition, reasoning skills, scholastic achievement, standardized testing, reliability, validity, student evaluation, performance assessment, portfolios, demonstrations. Applications to instruction and organization of curricular materials.

EdHD 5003. Developmental and Individual Differences in Educational Contexts. (3 cr; OP–Ed/Ed/Ed/Ed; init lic or CLA music ed or preteaching major or #; A-F only)

Overview of developmental and individual differences of children and adolescents in educational contexts; emphasis on a dynamic systems perspective; developmental transitions in childhood and adolescence; interactions between the student, environment, and task; and accommodations and adaptations for students in special education.

EdHD 5005. School and Society. (2 cr; OP–Ed/Ed/Ed; 5090; Ed/Ed/Ed/Ed; init lic student or CLA music ed major or preteaching major or #; A-F only)

Readings in history, philosophy, social sciences, and law revealing diverse educational values in a pluralistic society. Multiple expectations of schools. Civil liberties, rights, community. Varying cultural backgrounds of families, student circumstances, exceptional needs.

EdHD 5007. Technology for Teaching and Learning. (1.5 cr; CL 5300; Ed/Ed/Ed/Ed init lic student or CLA music ed major or preteaching major or #; A-F only)

Issues of prejudice/discrimination in terms of history, power, social perception. Knowledge/skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, leadership, judgment/collection making, prejudice reduction, conflict resolution, teaching in diverse educational settings.

Educational Policy and Administration (EdPA)

Department of Educational Policy and Administration

College of Education and Human Development

EdPA 1080. Special Topics in Leadership. (1-3 cr; max 6 cr; A-F only)

For topic, see Class Schedule.

EdPA 1301W. Personal Leadership in the University. (3 cr)

Introduces leadership using a personal leadership framework. Students examine their own views on leadership. Differences between personal/positional leadership, characteristics of leaders within the University, importance of personal development.

EdPA 3010. Special Topics for Undergraduates. (1-3 cr; max 6 cr; A-F only)

Introduction to educational policy and administration problems and issues.

EdPA 3021. Introduction to Historical Foundations of Modern Education. (3 cr)

Analysis of the evolution of school design in modern education derived from pre-classical sources: Greeks, Romans, Middle Ages, Renaissance, Reformation, Enlightenment, Industrial Revolution.

EdPA 3023. Introduction to History of Western Educational Thought. (3 cr)

Great educational classics of Western civilization: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, others.

EdPA 3302W. Leadership in the Community. (3 cr; EdPA 1301/PA 1961, declared undergraduate leadership minor; A-F only)

Leadership and leadership capacities from multicultural/multidimensional perspectives. Students examine their own views on leadership. Leadership theory/practice, group dynamics/behavior, applying knowledge.

EdPA 4303W. Leadership in the World. (3 cr; SP–3302 or PA 3961; completed field experience, undergraduate leadership minor; A-F only)

Leadership theory, community building, social change, interdisciplinary approaches to complex global issues. Students finalize portfolios, submit scholarly projects to demonstrate understanding of personal/positional leadership in changing global context. Capstone course.

EdPA 5001. Formal Organizations in Education. (3 cr)

Organizational theory; issues in educational organizations; and how general theories apply to schools, colleges and universities, and a variety of other organizations.

EdPA 5021. Historical Foundations of Modern Education. (3 cr)

Analysis and interpretation of important elements in modern education derived from pre-classical sources: Greeks, Romans, Middle Ages, Renaissance, Reformation, Enlightenment, and Industrial Revolution.

EdPA 5023. History of Western Educational Thought. (3 cr)

Great educational classics of Western civilization: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.

EdPA 5024. History of Ideas in American Education. (3 cr)


EdPA 5028. Education Imagery in Europe and America. (3 cr)

Images and ideas of education expressed in the visual arts of Western civilization (antiquity to 20th century) in relation to concurrent educational thought and practice; symbolism, myth, propaganda, didacticism, genre, caricature.

EdPA 5032. Comparative Philosophies of Education. (3 cr)

Exploration of the principal philosophies in educational thought today, e.g., realism, idealism, pragmatism, and postmodernism. Practice in philosophical critique.

EdPA 5036. Ethics, Morality, and Values in Education. (3 cr)

Application to key issues of professional practice. Moral education, virtues, principles.

EdPA 5041. Sociology of Education. (3 cr)

Structures and processes within educational institutions; linkages between educational organizations and their social contexts, particularly related to educational change.

EdPA 5044. Introduction to the Economics of Education. (3 cr)

Costs and economic benefits of education, with a focus on K-12; educational markets, prices, and production relationships; investment and cost-benefit analyses.

EdPA 5048. Cross-Cultural Perspectives on Education. (2 cr; SP–S)

Introduction to cultural variables of leadership that influence functioning of cross-cultural groups. Lectures, case studies, discussion, problem-solving, simulations. Intensive workshop. Enrollment limited.

EdPA 5052. Ethnic Groups and Communities: Families, Children, and Youth. (3 cr)

Roles of young people in widely varied North American communities. Comparative aspects of youth commitment to society, economic value of youth,
EdPA 5056. Case Studies for Policy Research. (3 cr; A-F only) Qualitative case study research methods and their applications to educational policy and practice. Emphasis on computer-based tools that employ open-ended interviewing as primary data collection technique.

EdPA 5061. Ethnographic Research Methods. (3 cr) Practice in aspects of field methodology below the level of full field study; detailed reading; analysis of studies in anthropology and education for methodological content.

EdPA 5064. Divergent Perspectives in Educational Policy and Practice. (3 cr) Examines fundamental and current issues in the field of education. Participants learn how to approach an issue from multiple perspectives, develop skills to identify and analyze its component parts, and examine personal belief systems to place a given issue within a personal context.

EdPA 5080. Special Topics: Educational Policy and Administration. (1-3 cr [max 24 cr]) Topical issues in educational policy/administration.

EdPA 5087. Seminar: Educational Policy and Administration. (1-3 cr [max 24 cr]) Shared responsibility of students/instructor in presentation of topics.

EdPA 5095. Problems: Educational Policy and Administration. (1-3 cr [max 24 cr]) Course or independent study on specific topic within department program emphasis.

EdPA 5096. Internship: Educational Policy and Administration. (1-3 cr [max 24 cr]) Internship in elementary, secondary, general, or postsecondary administration, or other approved field related setting.

EdPA 5101. International Education and Development. (3 cr) Introduction to comparative and international development education, contemporary theories regarding the role of education in the economic, political, and sociocultural development of nations; examination of central topics and critical issues in the field.

EdPA 5102. Knowledge Formats and Applications: International Development Education Contexts. (3 cr) Analyzes the interrelationships of "knowledge capital" (noetic symbolic resources) and culture through intrinsic, cross-, and multicultural perspectives. Distinguishes knowledge from information and data, focusing on national and international developments occurring along basic and applied knowledge paths.

EdPA 5103. Comparative Education. (3 cr) Examination of systems and philosophies of education globally with emphasis upon African, Asian, European, and North American nations. Foundations of comparative study with selected case studies.

EdPA 5121. Educational Reform in International Context. (3 cr) Critical policy analysis of educational innovation and reform in selected countries. Use theoretical perspectives and a variety of policy analysis approaches to examine actual educational reforms and their implementation.

EdPA 5124. Critical Issues in International Education and Development. (3 cr) Analysis of comprehensive policy-oriented frameworks for international education; practices of U.S. and other universities; conceptual development of international and practical application to programs, to employment choices, and to pedagogy.

EdPA 5128. Anthropology of Learning. (3 cr) Cross-cultural perspectives in examining educational patterns; the implicit and explicit cultural assumptions underlying them. Methods and approaches to cross-cultural studies in education.

EdPA 5324. Financial Management for Elementary-Secondary Education. (3 cr) Provides an overview of state-local school finance systems, budgeting, governmental fund accounting, and interpretation of financial information. For graduate students pursuing licensure as elementary-secondary principals and superintendents.

EdPA 5328. Introduction to Educational Planning. (3 cr) Principles, tools, comparative practices, and emerging issues in K-12 and higher education settings; decision making models; strategic and project planning; barriers to effectiveness; and change management processes.

EdPA 5329. Leadership Development Seminar. (3 cr) Assessment and development of skills required of the educator in planning, decision making, and human relations. Introduction to contemporary issues in educational administration.

EdPA 5336. Laboratory in Decision Making. (3 cr) Contributions of recent research and theory to effective administration. Analysis of administrative behavior in realistic settings; relations of administration to human behavior.

EdPA 5341. The American Middle School. (3 cr) Focus on the uniqueness of the early adolescent and appropriate learning situations. For educators working with middle-level students.

EdPA 5344. Law and Educational Policy. (3 cr) Reviews of the legal foundations of educational policy; statutory themes and case law; implications for educational organizations and administrative practice; case studies and emergent issues in recent court rulings.

EdPA 5346. Politics of Education. (3 cr; SP-Postbac, MED, or grad student; A-F only) Political dimensions of policy formulation/implementation in education. Use of power/influence in shaping educational policies and in resolving conflicts over educational issues. Analysis of consequences/cross-impacts.

EdPA 5348. Public School Personnel Programs. (3 cr) Focus on educational policy and practice of the personnel system in education; selection, assignment, evaluation, and development of school personnel; collective bargaining and the grievance process.

EdPA 5352. Projective Leadership for Strategic Learning Communities. (3 cr) Explores many trends and changes facing society, culture, and education from a strategic learning community perspective; helps students “futurize the present.”

EdPA 5356. Contemporary Services for Persons With Disabilities. (3 cr) Policy, research, and current practices related to education, health, and social services that support children, youth, and adults with special needs, and that support their families. Federal, state, local perspectives.

EdPA 5361. Project in Teacher Leadership. (3-6 cr; SP-MEd student in Teacher Leadership Program) Create, implement, evaluate, and present a leadership project designed to initiate positive change in educational environments. Review of related literature, proposal development, project development, implementation, and evaluation, critical reflection, sharing learning outcomes.

EdPA 5364. Leadership for School Improvement. (3 cr; SP-MEd student or A-F only) Current research/practice on educational leadership focused on creating school cultures conducive to continuous improvement/change. Strategies for personal/organizational leadership in PK-12 settings.

EdPA 5368. Special Services Policy and Administration. (3 cr) Legislative, procedural, executive, and judicial actions that affect services, families, and children with special needs at all levels of government: federal, state, and local. For administrators, supervisors, and other professionals responsible for managing general, special, and alternative education programs.

EdPA 5372. Youth in Modern Society. (3 cr) Youth in advanced societies and as a social entity: functions and roles in industrial society, family, education, politics and government, economy and work, welfare and religion; organizations, social movements, and subcultures; empirical research and comparative/cultural perspectives.

EdPA 5374. Leadership for Staff Development. (4 cr; SP-Postbac at least 3 yrs teaching experience) Designing, implementing, evaluating staff development in PK-12 settings. Research-based standards for effective staff development. Need for embedded time for collaborative learning, evaluating staff/students outcomes.

EdPA 5376. Organizational Approaches to Youth Development. (3 cr) Defining youth development within framework of formal and informal organizations; organizational systems responsible for youth development in the community; policy issues surrounding these systems.


EdPA 5381. The Search for Children and Youth Policy in the United States. (3 cr) Review of contemporary policy issues affecting children and youth in the United States and South Africa; identify national standards, norms and principles of youth development; conflicting expectations facing policy-makers; and search for the critical content of youth policy.

EdPA 5384. Collaboration in Heterogeneous
Course Descriptions

Classrooms and Schools. (3 cr; A-F only) Policy, research, practice base for addressing range of student abilities/needs in diverse schools. Collaborative approaches to curricular, instructional, social support.

EdPA 5396. Field Experience in PK-12 Educational Administration. (2-6 cr; SP-5-5 N-A only) Field experience or internship assigned for students seeking licensing under a PK-12 principal/supervisor. Content/credit depend on licensure requirements specified in individual field experience agreement.

EdPA 5501. Principles and Methods of Evaluation. (3 cr) Introduction to program evaluation. Planning an evaluation study, collecting and analyzing information, reporting results; evaluation strategies; overview of the field of program evaluation.

EdPA 5521. Cost and Economic Analysis in Educational Evaluation. (3 cr; S-N only) Use and application of cost-effectiveness, cost-benefit, cost-utility, and cost-feasibility in evaluation of educational problems and programs.

EdPA 5524. Evaluation Colloquium. (1 cr; max 24 cr; QP-5240 or SP 5285 or EPsy 5243; SP-5501 or EPsy 5243; S-N only) Individual seminar of faculty and advanced students interested in the issues and problems of program evaluation.

EdPA 5701. American Higher Education. (3 cr) American higher and postsecondary education in historical and contemporary perspectives; special emphasis on societal and political demands on higher education system; consequent changes in various forms and functions.

EdPA 5704. Student and Faculty Issues in Higher Education. (3 cr; QP-5201) College student development, curricular/ extracurricular activities, faculty work development, student-faculty interaction.

EdPA 5721. Racial and Ethnic Diversity in Higher Education. (3 cr) Review of research. Theoretical frameworks, methodological perspectives, and research strategies used to study students, staff, and faculty; historical perspectives.

EdPA 5724. Leadership and Administration of Student Affairs. (3 cr) Strategies, models, coordination, and evaluation of programs in college and university student affairs.

EdPA 5728. Two-Year Postsecondary Institutions. (3 cr) Present status, development, functions, organization, curricular models in postsecondary, but nonbaccalaureate, institutions.

EdPA 5732. The Law and Postsecondary Institutions. (3 cr) Analysis of court opinions and federal regulations affecting postsecondary educational institutions.

Educational Psychology (EPsy)

Department of Educational Psychology
College of Education and Human Development

EPsy 1600. Special Topics: Developing Special Educational and Human Service Programs. (1-4 cr) (max 15 cr) (SP-5-5 N-A only) Explores the concepts, issues, and practices in developing special education and human services for persons with disabilities. Appropriate for persons in paraprofessional positions.

EPsy 3119. Learning, Cognition, and Assessment. (3 cr; A-F only) Principles of learning, cognition, cognitive development, classroom management, motivation, instruction, and assessment. Topics: behaviorism, cognitive and social constructivism, human information processing theory, intelligence, knowledge acquisition, reasoning skills, scholastic achievement, standardized testing, reliability, validity, student evaluation, performance assessment, and portfolios.

EPsy 3132. Psychology of Multiculturalism in Education. (3 cr; A-F only) Course critically examines social and cultural diversity in the United States, confronting social issues of poverty, biology, education, sexism, victim-blaming, violence, and so on, and presenting models for change. Students examine how and why prejudices develop.

EPsy 3133. The Psychology of Ethics. (3 cr) An examination of morality from the perspective of psychology. Exploration of major research traditions and their ethical and educational implications.

EPsy 3264. Basic and Applied Statistics. (3 cr) Introductory statistics with emphasis on understanding and applying statistical concepts and procedures. Topics include visual and quantitative methods for presenting and analyzing data, common descriptive indices for univariate and bivariate data, and introduction to inferential techniques.

EPsy 5101. Intelligence and Creativity. (3 cr; A-F only) Contemporary theories of intelligence and intellectual development and contemporary theories of creativity and their implications for educational practices and psychological research.

EPsy 5112. Knowing, Learning, and Thinking. (4 cr; A-F only) Principles of human information processing, memory, and thought; mental operations in comprehension and problem solving; developing expertise and automaticity; emphasis on applied settings.

EPsy 5113. Psychology of Instruction and Technology. (3 cr) Introduction to adult learning and instructional design. Application of core foundational knowledge to development of effective learning environments for adults. Topics include philosophy, learning theories, instructional models, development and experience, individual differences, evaluation, assessment, and technology.

EPsy 5114. Psychology of Student Learning. (3 cr; A-F only) Principles of educational psychology: how learning occurs, why it fails, and implications for instruction. Topics include models of learning, development, creativity, problem-solving, intelligence, character education, motivation, diversity, special populations.

EPsy 5115. Psychology of Adult Learning and Instruction. (3 cr) Survey of adult learning/instruction. Emphasizes instructional design, learning theories, experience, individual differences, evaluation, tests/measurement, technology. Implications for curricular/instructional design in higher education, continuing education, professional/business related training.

EPsy 5117. Problem Solving and Decision Making. (3 cr; A-F only) Strategies, rules, methods, and other cognitive components involved in problem solving and decision making, implications for educational practices, and applied domains.

EPsy 5125. Psychology of Building Character, Values, and Behavior. (3 cr; A-F only) New approaches to motivation, building prosocial values and behavior; how to alter values and behavior of anti-social individuals; strengths and weaknesses of traditional approaches to character education; instilling prosocial values as a way to alter negative behaviors.

EPsy 5135. Human Relations Workshop. (4 cr; S-N only) Experiential course addressing issues of prejudice and discrimination in terms of history, power, and social perception. Includes knowledge and skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, effective leadership, judgment and decision-making, prejudice reduction, conflict resolution.

EPsy 5151. Cooperative Learning. (3 cr) Participants learn how to use cooperative learning in their setting. Topics include theory and research, teacher’s role, essential components that make cooperation work, teaching social skills, assessment procedures, and collegial teaching teams.

EPsy 5152. Psychology of Conflict Resolution. (3 cr) Overview of the field of conflict resolution. Major theories, research, major figures in the field, factors influencing quality of conflict resolution are covered. The nature of conflict, the history of field, and intrapersonal, interpersonal, intergroup conflict, negotiation, mediation are discussed.

EPsy 5154. Organization Development and Change. (3 cr) Overview of organizational development and change. Normative models of effective organizations, entry and contracting skills, diagnosis procedures and intervention procedures (data feedback, skills training, continuous improvement).

EPsy 5155. Group Dynamics and Social Influence. (3 cr) Overview of the field of group dynamics with emphasis on social influence. Major theories, research, and figures in the field are covered. Group goals, communication, leadership, decision making, problem solving, conflicts, power, uniqueness theory, deindividuation, and minority influence will be covered.

EPsy 5156. Social and Personality Influences on Education. (4 cr; A-F only) Survey of social psychology and personality applied to education. Application of major theories and research to classroom and school practices and educational issues are emphasized. Class sessions include lectures, discussions, simulations, experiential exercises. Intrapersonal, interpersonal, and group dynamics are discussed.

EPsy 5157. Social Psychology of Education. (3 cr; A-F only) Overview of social psychology and its application to education. Participants study the major theories, research, and major figures in field. Class sessions include lectures, discussions, simulations, role-plays, and experiential exercises.

EPsy 5191. Education of the Gifted and Talented. (3 cr; A-F only) Theories of giftedness, talent development, instructional strategies, diversity and technological issues, implications for educational practices and psychological inquiry, and international considerations.

EPsy 5200. Special Topics: Psychological Foundations. (1-4 cr; max 30 cr) Focus on special topics in psychological and methodological concepts relevant to advanced educational theory, research, and practice not covered in other courses.

EPsy 5216. Introduction to Research in Educational Psychology. (3 cr; QP-5260 or other intro statistics course; SP-5261 or other intro statistics course; A-F only) Introduction to educational research, leading students through the basic steps involved in designing and conducting a research study. Topics include reviewing literature, formulating research problems, using different approaches to gather data, managing and analyzing data, and reporting results.

EPsy 5221. Basic Principles of Educational Measurement. (3 cr; QP-5260 or equiv; SP-5261 or equiv) Concepts, principles, and methods in educational and psychological measurement. Specifically, the course will cover reliability, validity, item analysis, scores, grades, scales, test construction, and test evaluation.

EPsy 5231. Introductory Statistics and Measurement in Education. (4 cr) Students develop an understanding of basic statistics and measurement concepts and tools and apply them to the collection, analysis, and interpretation of data.

Course Descriptions

EPsy 5246. Evaluation Colloquium: Psychological Foundations. (1 cr; max 8 cr; QP–5240/EdPA 5285; SP–5243/EdPA 5501; S-N only)
Informal seminar of faculty and advanced students interested in issues and problems of program evaluation.

EPsy 5261. Introductory Statistical Methods. (3 cr)
Application of statistical concepts/procedures. Graphs, numerical summaries. Normal distribution, correlation, regression analysis, probability, statistical inferences for one or two samples. Hypothesis tests, Chi-square tests. Conceptual understanding/ application of statistics.

EPsy 5262. Intermediate Statistical Methods. (3 cr; SP–5261 or eq)

EPsy 5263. Statistics for Preprofessional Students. (3 cr)
Descriptive statistics for continuous variables, simple regression and correlation, inferences on means, introduction to analysis of variance and multiple regression, contingency tables, and computer analysis techniques.

EPsy 5281. Introduction to Computer Operations and Data Analysis in Education and Related Fields. (3 cr; S-N only)
Introductory computer literacy course to familiarize students with personal computers and computing resources at the University. Applications include electronic communications, spreadsheets, graphical presentation, and data analysis.

EPsy 5400. Special Topics in Counseling Psychology. (1-4 cr [max 8 cr])
Theory, research, and practice in counseling and student personnel psychology. Topics vary.

EPsy 5401. Counseling Procedures. (3 cr; QP–Upper div student; SP–Upper div student)
Emphasis on the counseling relationship and principles of interviewing. Case studies, role playing, and demonstration. For individuals whose professional work includes counseling and interviewing.

EPsy 5412. Introduction to Developmental Counseling and Guidance. (3 cr; QP–SP–F)
Contemporary models of counselors as advocates for all students. Emphasizes prevention and systems intervention with counselors involved in the developmental guidance curriculum, school change, staff and community collaboration, individual student planning, and learning success with diverse populations.

EPsy 5421. Leadership and Administration of Student Affairs. (3 cr; A-F only)
Theoretical approaches, administrative structure, and evaluation methods used in college/university student affairs.

EPsy 5422. Principles of Group Work: Theory and Procedures. (3 cr; QP–Advanced undergrad or grad student in the helping professions; SP–Advanced undergrad or grad student in the helping professions)
Principles and practices of group work for educators and the helping professions. Discussion of various types of groups (e.g., counseling support, task, psychoeducational). Applications to various settings and populations (e.g., schools and community agencies).

EPsy 5432. Foundations of Individual/Organizational Career Development. (3 cr; A-F only)
Introduction to individual and organizational career development theory and practice. Examines critical issues in work patterns, work values, and workplaces in a changing global society, with implications for career planning, development, and transitions, emphasizing personal and organizational change.

EPsy 5433. Counseling Women Over the Life Span. (3 cr; QP–Counseling or career development course; SP–Counseling or career development course)
Counseling skills and interventions to facilitate career development of women and girls of different life stages and backgrounds (school girls to older women); development of systematic integrative life planning framework; facts, myths, and trends regarding women’s changing roles.

EPsy 5434. Counseling Adults in Transition. (3 cr; QP–Advanced undergrad or grad student in the helping professions; SP–Advanced undergrad or grad student in the helping professions)
Psychological, physical, and social dimensions of adult transitions (e.g., family and personal relationships, career). Adult development theories, stress and coping, and helping skills and strategies as they relate to adult transition.

EPsy 5451. The College Student. (3 cr)
The psychology and sociology of college students, including research concerning diversity of student, student society, culture, mental health, underachievement, dropouts, values and attitudes, and relevant research methods.

EPsy 5461. Cross-Cultural Counseling. (2 cr; A-F only)
Emphasis on the effect of cross-cultural and cross-national psychological differences in human traits and characteristics. These theoretical differences provide a framework for the development and implementation of effective cross-cultural counseling interventions.

EPsy 5601. Survey of Special Education. (2 cr)
Introduction to programs and services provided to people with disabilities in school and community settings. Emphasis on the needs of families, to the roles and responsibilities of teachers, and to related service providers.

EPsy 5602. Computer Technology in Special Education. (2 cr; A-F only)
Develop skills, understand processes, and identify resources needed to utilize technology to benefit persons with disabilities. Emphasis on learning theory, principles of effective instruction, and assistive technology integration.

EPsy 5603. Childhood Language Development: Classroom Implications. (3 cr)
Recent trends and findings in the study of language acquisition and comprehension; classroom implications, including education of exceptional children and implications of diversity on instruction.

EPsy 5604. Transition from School to Work and Community Living for Persons With Special Needs. (2 cr)
Design of training programs to promote independent living. Vocational and community adjustment for persons with disabilities and who are at-risk. Curriculum materials, methods, and organizational strategies for adolescents and adults, families, and community service providers.

EPsy 5609. Family-Centered Services. (2 cr; A-F only)
Methods for collaborating with families in the education of children with disabilities. Focus on family-centered approach to design of educational plans and procedures. Specific emphasis on multicultural perspectives of family life and expectations for children.

EPsy 5612. Understanding of Academic Disabilities. (3 cr; A-F only)
Introduction to issues related to the education of students with academic disabilities (learning disabilities, mild mental intellectual disabilities, and emotional/behavioural disabilities) including history, definition, assessment, classification, legislation, and intervention approaches.

EPsy 5613. Foundations of Special Education I. (3 cr)
QP–Child development course, 5601 or equiv; SP–Child development course, 5601 or equiv; A-F only)
Education on the organization of educational programs and services for people with disabilities and their families. First course for students seeking to become licensed teachers in special education.

EPsy 5614. Foundations of Special Education II. (3 cr; QP–5601, 5608 or 5609; SP–5613; A-F only)
Emphasis on assessment, planning, and implementing educational programs for people with disabilities.

EPsy 5615. Advanced Academic Interventions. (3 cr; QP–5612, 5616; A-F only)
Advanced knowledge and skills in designing, implementing, and evaluating Individual Educational Plans (IEPs) for students eligible for special education service in learning disabilities, emotional/behavioral disorders, and mild mental intellectual disabilities.

EPsy 5616. Behavior Analysis and Classroom Management. (3 cr)
Introduction to assumptions, principles, and procedures of behavioral approach to analyzing behavior and programs for classroom management. Emphasis on specifying problems, conducting observations, intervening, and evaluating behavioral change.

EPsy 5621. Functional/Basic Academic Interventions in Mental Retardation. (3 cr; QP–5601; SP–5613, 5614; A-F only)
Methods and materials course emphasizing functional approaches to promoting academic learning in students with mild to moderate mental retardation and moderate to severe mental retardation.

EPsy 5622. Programs and Curricula for Learners With Severe Disabilities. (3 cr; QP–5116; SP–5616)
Emphasis on developing programs and curricula for students with moderate, severe, and profound developmental delays, as well as for severe multihandicapped conditions. Special consideration given to preparing children and youth for integrated community environments.

EPsy 5624. Biomedical and Physical Aspects of Developmental Disabilities. (2 cr; A-F only)

EPsy 5625. Education of Infants, Toddlers, and Preschool Children With Disabilities: Introduction. (2 cr; A-F only)
Overview of the issues, problems, and practical applications in designing early intervention services for young children with disabilities and their families.

EPsy 5626. Seminar: Developmental Disabilities and Instructional Management. (3 cr; QP–5116, 5622; SP–5612, 5622)
Data-based strategies for school and nonschool instruction of learners with developmental disabilities including assessment, design, implementation, and evaluation of curriculum and instruction: curriculum content, concept and task analysis, classroom arrangements, natural and instructional cues, corrections, and consequences.

EPsy 5635. Education of Students With Physical and Health Disabilities. (3 cr; QP–5601 or SP–5601 or SP–5601 or; A-F only)
Introduction to students with physical and health disabilities and their characteristics; the educational implications of physical disabilities; assessment procedures and appropriate educational interventions for learners with physical and health disabilities.

EPsy 5636. Education of Multihandicapped Learners With Sensory Impairments. (2 cr; QP–RP–5613, 5614)
Characteristics of learners with visual and auditory impairments; design of instructional programs to remediate or circumvent disabilities, including use of prosthetic devices; related areas of performance affected by sensory impairments.
Course Descriptions

Historical and philosophical issues related to education of individuals who are deaf or hard of hearing. Implications of causes of hearing loss, social and cultural relationships, philosophies of education, characteristics and educational guidelines, and their applicability to education of individuals who are deaf or hard of hearing.


EPsy 5646. Reading and Writing Practices With Deaf/Hard of Hearing Students. (3 cr; OP – 5643, 5644 or SP – 5644 or general education methods in tchg reading and writing skills; or #)
Gaining knowledge and skills to assess, plan, and implement instruction for children and youth with hearing loss. Emphasis is placed on research, theoretical, and programmatic issues in developing reading and writing skills, curricular adaptations, and effective instructional approaches.

Study of the speech and hearing mechanisms, causes of hearing loss, and rehabilitation. Emphasis on instructional practices, aural rehabilitation in the educational setting, adaptive technology, and adaptations to optimize functional skills with individuals who are deaf or hard of hearing.


EPsy 5649. Models of Instructional Programming With Deaf and Hard of Hearing Students. (3 cr; OP – 5644 or SP – 5644, 5646 or #)
Design/development of portfolios for various models of educational service delivery systems for individuals with hearing loss. Emphasizes consultation skills, curriculum management/modifications, material/technology applications, and support service adaptations.

EPsy 5650. Social and Interpersonal Characteristics of Students With Disabilities. (3 cr; A-F only)
Emphasis on children and youth of school age and on the ways in which their emotional, social, and behavioral disorders affect their functioning in school and other settings in which their behaviors disturb others. Adaptations to optimize functional skills with students who are deaf or hard of hearing.

EPsy 5651. Structure and Function of the Eye: Educational Implications. (3 cr; A-F only)
Anatomy and physiology of eye parts relating to visual perception. Educational considerations for students with low vision studied in relation to ophthalmological and optical evaluations and functional vision screening.

EPsy 5652. Case Management for Children With Visual Disabilities. (3 cr; OP – 5671, 5673, 5675; SP – 5671, 5673, 5675; A-F only)
Advanced course evaluating and managing cognitive, psychosocial, physical, and academic needs of students. Consideration of parent, teacher, and student in counseling and educational program management.

EPsy 5681. Education of Infants, Toddlers, and Preschool Children With Disabilities: Methods and Materials. (3 cr; OP – 5625, SP – 5625; A-F only)
Overview of methods and materials available to maximize the developmental and educational outcomes for young children, birth to age 5, with disabilities and their families in home, community, and school-based settings.

EPsy 5701. Practicum: Field Experience in Special Education. (1-6 cr; max 12 cr; SP – [SPed grad or SPed licensure Program or Foundations of Educ Program], [5613 or 56513] [5614 or 56144] or 5614 or SP – #; A-F only)
Observations, supervised support of teaching practice in schools or other agencies serving children with disabilities in integrated programs.

EPsy 5720. Special Topics: Special Education. (1-4 cr; max 12 cr; SP – #)
Lab and fieldwork approach, often assuming a product orientation, e.g., generation of action plan, creating set of observation field notes, collecting data in some form. Provides opportunities for educational personnel to study specific problems and possibilities related to special education.

EPsy 5740. Special Topics: Interventions and Practices in Educational and Human Service Programs. (1-4 cr; max 8 cr; OP – #; SP – #)
Concepts, issues, and practices related to the community involvement of youth, children, and adults with developmental disabilities through weekly seminar and extensive supervised experience working with individuals within the community.

EPsy 5751. Student Teaching: Deaf/Hard of Hearing. (1-6 cr; max 10 cr; OP – #; SP – #; S-N only)
Students participate in educational programming for infants, children, and youth who are deaf or hard of hearing, as well as in onsite, directed experiences under the supervision of master teachers of deaf and hard of hearing students.

EPsy 5752. Student Teaching: Learning Disabilities. (1-6 cr; max 10 cr; OP – #; SP – #; S-N only)
Supervised experience in teaching or related work in schools or other agencies serving children and adolescents with learning disabilities.

EPsy 5753. Student Teaching: Early Childhood Special Education. (1-6 cr; max 8 cr; OP – #; #; completion of all licensure requirements; A-F only)
Supervised experience in teaching or related work in schools, agencies, or home settings with infants, toddlers, and preschoolers with disabilities and their families.

EPsy 5754. Student Teaching: Social and Emotional Disabilities. (1-6 cr; max 6 cr; OP – #; completion of all licensure coursework; A-F only)
Supervised student teaching, special practicum project, in schools, or other agencies serving individuals at the secondary level who have mild to moderate as well as moderate to severe disabilities.

EPsy 5755. Student Teaching: Developmental Disabilities – Elementary. (1-6 cr; max 6 cr; OP – completion of all licensure coursework; SP – completion of all licensure coursework; A-F only)
Supervised student teaching, special practicum project, in schools, or other agencies serving children at the elementary level who have mild to moderate as well as moderate to severe disabilities.

EPsy 5757. Student Teaching: Social and Emotional Related Disabilities. (1-6 cr; max 8 cr; OP – #; SP – #; A-F only)
Supervised student teaching and related work (direct instruction and consultation) in schools or other agencies serving children and adolescents who have physical disabilities.

EPsy 5758. Student Teaching: Visual Impairments. (1-6 cr; max 8 cr; OP – SP – A-F only)
Supervised student teaching, special practicum project, in schools or other agencies serving children and adolescents who have visual impairments.

EPsy 5801. Assessment and Decision Making in School and Community Settings (3 cr; A-F only)
Introduction to psychological and educational assessment for individuals who work with children, especially those experiencing academic and behavior problems. Study of standardized group and individual tests of intelligence, achievement, socio-emotional functioning, perception, reading, mathematics, adaptive behavior, and language.

EPsy 5849. Observation and Assessment of the Preschool Child. (3 cr)
Introduction to assessment principles and practices, including observational assessment methods, for children (birth to 5). Intended primarily for teachers in training and others interested in basic information regarding assessment and its relationship to intervention services for young children.

EPsy 5851. Collaborative Family-School Relationships. (2-3 cr; OP – Honors senior class or grad student; SP – Honors senior class or grad student)
Theoretical and empirical models for creating collaborative family-school relationships for students’ development and educational success in school. Emphasis on model programs for K-12 and practical strategies for educational personnel to address National Educational goal 8.

EPsy 5852. Prevention and Early Intervention. (3 cr)
Theory/research base for school-based primary/secondary programs to improve academic social competence of children/youth (birth to grade 12).

EPsy 5871. Interdisciplinary Practice and Interagency Coordination in Education and Human Services. (3 cr)
Principles and procedures of interdisciplinary practice and interagency coordination. Examine the relative strengths of interdisciplinary approaches, develop skills for collaborating with others, and examine different approaches to interagency coordination.
Course Descriptions

EE 301. Introduction to Digital System Design. (Discussion. 0 cr; SP–[3011, 3062]; SP–[3015, 3115]; no EE or CompE grad cr)

Course Descriptions

EE 3505. Communications Systems Laboratory. (1 cr; QP–[3011, 5002, upper div IT] or #; no EE or CompE grad cr)

EE 101. Introduction to Electrical and Computer Engineering. (1 cr; QP–lower div IT or A; SP–Lower div IT or A; S-N only)

Introduction to engineering in general and to computer engineering in particular. Exploration of techniques and technologies developed by electrical and computer engineers.

EE 3506. Fundamentals of Electrical Engineering Laboratory. (1 cr; QP–[3011, 3062]; SP–[3015, 3115]; no EE or CompE grad cr)

Lab to accompany 3005.


EE 1001. Introduction to Electronic and Electrical Circuits. (0 cr; QP–Phys 1253, Math 2361; SP–Phys 1302, Math 2243 or 2273 or 2573)


EE 2006. Introductory Circuits Laboratory. (0.5 cr; QP–1400, 3010, 3061) In combination with 1400, completes the 2001 requirement.

EE 3006. Fundamentals of Electrical Engineering Laboratory. (1 cr; QP–[3011, 3062]; SP–[3015, 3115])

Experiments in circuits and electronics.

EE 3010. Introduction to Microcontrollers. (4 cr; QP–CSci 3113; SP–3010, 3115, (1113 or 1901); SP–3015)

Microcomputer organization, assembly language programming, arithmetic/logical operations, parallel/serial input/output. Microprocessor/microcontroller interfacing: memory design, exception handling, interrupts, using special-purpose features such as A/D converters, fuzzy logic, DSP operations. Integral lab.

EE 3005. Fundamentals of Electrical Engineering. (4 cr; QP–Math 3261, Phys 1253; not for EE majors; SP–Math 2243, Phys 3102; not for EE majors)

Fundamentals of analog electronics, digital electronics, and power systems. Circuit analysis, electronic devices and applications, digital circuits, microprocessor systems, operational amplifiers, transistor amplifiers, frequency response, magnetically coupled circuits, transistors, steady state power analysis.

EE 3011. Circuits and Electronics Laboratory I. (2 cr; QP–[3011, 3062]; SP–3115 or 3151)

Lab to accompany 3011.

EE 3012. Circuits and Electronics Laboratory II. (2 cr; QP–3011, 3062; SP–3101)

Experiments in circuits and electronics; team design project.

EE 3510. Analog and Digital Electronics. (4 cr; QP–SP–3010; SP–[3011, 3051])


EE 3601. Transmission Lines. (3 cr; QP–[3009, Math 3252 or Math 2361]; Phys 1253; SP–[3011, Math 2243 or Math 2373; Math 2371]; SP–Math 1402) Transmission line circuit interconnections. Timed frequency domain behavior of infinite/terminated transmission lines/line segments as circuit components. Calculating transmission line parameters using electromagnetic methods.

EE 3961. Industrial Assignment I. (1 cr; QP–Admission to ECE co-op program. ECE admission to ECE co-op program) S-N only

Industrial work assignment in Electrical and Computer Engineering co-op program. Grade based on student’s written report of semester’s assignment, but deferred until completion of 4961.

EE 4111. Analog Electronics Design Using Operational Amplifiers. (4 cr; QP–[3011, 3062; SP–3015, 3115; no EE or CompE grad cr)


EE 4231. Linear Control Systems: Designed by Input/Output Methods. (4 cr; QP–[3011, 3002, upper div EE or grad student in IT major] or SP–[3015, 4541, upper div IT or grad student in IT major] or #; no EE or CompE grad cr)


EE 4233. State Space Control System Design. (3 cr; QP–[3011, 3002, upper div IT] or SP–[3015, 4541, upper div IT] or #; no EE or CompE grad cr)


EE 4235. Linear Control Systems Laboratory. (1 cr; QP–[3015, 4231] or SP–3233; no cr for [EE or CompE] grad students) Lab to accompany 4231.

EE 4237. State Space Control Laboratory. (1 cr; QP–[3015, 4233] or [3233; no cr for [EE or CompE] grad students) Lab to accompany 4233.


EE 4341. Microprocessor and Microcontroller System Design. (4 cr; QP–3351, 3352, upper div IT, SP–2301, 3611, upper div IT, no EE or CompE grad cr)


EE 4501. Communications Systems. (3 cr; QP–3021; SP–3025; no EE or CompE grad cr)


EE 4505. Communications Systems Laboratory. (1 cr; QP–[5201, 5202; SP–4501 or ¶4501; no EE or CompE grad cr)

Experiments in analysis/design of wired/wireless communication systems. Lab to accompany 4501.

EE 4541. Digital Signal Processing. (3 cr; QP–3011, 3021; SP–3015, 3025) Review of linear discrete time systems and sampled and digital signals; Fourier analysis, discrete and fast Fourier transforms; interpolation and decimation; design of analog, infinite-impulse response and finite impulse response filters; quantization effects.

Course Descriptions

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EE 4601. Electromagnetics for RF Engineering and Optics. (4 cr; QP–3110 or equiv; SP–3601 or equiv; no EE grad cr; no CompE grad cr; A–F only) Electromagnetics, magnetostatics, electromagnetic induction, Maxwell’s equations, wave propagation in free space, guides, reflections from perfect conducting and nonperfect dielectric interfaces, resonators/antennas. For students interested in microwave engineering.

EE 4701. Electric Drives. (3 cr; QP–3011; SP–3015) AC/DC electric-machine drives for speed/position control. Integrated discussion of electric machines, power electronics, and control systems. Computer simulations. Applications in electric transportation, robotics, process control, and energy conservation.

EE 4721. Introduction to Power System Analysis. (3 cr; QP–3010; SP–2011) AC power systems; analysis of large power system networks; mathematics and techniques of power flow analysis, short circuit analysis, and transient stability analysis; use of a power system simulation program for design. Integral lab.

EE 4741. Power Electronics. (3 cr; QP–3011, 3062; SP–3015, 3115) Switch-mode power electronics. Switch-mode DC power supplies. Switch-mode converters for DC and AC motor drives, wind/photovoltaic inverters, interfacing power electronics equipment with utility systems. Power semiconductor device and module design, magnetic design, semiconductor-bridge interference (EMI).

EE 4951W. Senior Design Project. (2 cr; QP–3011, 3111, 3062; SP–3015, 3016, 3115) Team participation in formulating and solving open-ended design problems. Oral and written presentations.

EE 4961. Industrial Assignment II. (2 cr; QP–3476, ECE co-op; no grad cr; SP–3961, ECE co-op; no grad cr; S-N only) Industrial work assignment in ECE co-op program. Grade based on student’s formal written report covering semester’s work.

EE 4962. Industrial Assignment III. (1 cr; QP–5478; no grad cr; SP–4961, ECE co-op; no grad cr; S-N only) Industrial work assignment in ECE co-op program. Formal written report covering semester’s work.

EE 4970. Directed Study. (1-3 cr; QP–Cr r [may be repeated for cr]; SP–Cr r [may be repeated for cr]; A) Studies of approved projects, either theoretical or experimental.

EE 4982V. Senior Honors Project II. (2 cr; QP–/A; SP–4981, ECE honors; A) Design project.


EE 5164. Semiconductor Devices and Properties II. (3 cr; QP–3561 or #; SP–5163 or #) Principles and properties of semiconductor devices. Charge control in different FETs, transport, modeling, Bipolar transistor models (Ebers-Moll, Gummel-Poon), heterostructure bipolar transistors. Special devices.

EE 5171. Microelectronic Fabrication. (4 cr; QP–IT or grad cr; SP–IT or grad cr) Fabrication of microelectronic devices; silicon integrated circuits, GaAs devices; lithography, oxidation, diffusion; process integration of various technologies, including CMOS, double poly bipolar, and GaAs MESFET.

EE 5173. Basic Microelectronics Laboratory. (1 cr; QP–55670; SP–55171 or #5171) Students fabricate 3M2, Contact gate, single-layer metal, MOS field effect, 80 percent of processing, including photolithography, diffusion, oxidation, and etching. In-process measurement results are compared with final electrical test results. Simple circuits are used to estimate technology performance.

EE 5231. Linear Systems and Optimal Control. (3 cr; QP–IT grad, Math 5242; Math 5243 or #; SP–IT grad, 3015, 5201 or #) Properties and modeling of linear systems; linear quadratic and linear-quadratic-Gaussian regulators; maximum principle.

EE 5235. Robust Control System Design. (3 cr; QP–IT grad, Math 5243 or Math 5242 or #; SP–IT grad, 3015, 5201 or #) Development of control system design ideas; frequency response techniques in design of single-input/single-output (and MIMO) systems. Robust control concepts. CAD tools.

EE 5301. VLSI Design Automation I. (3 cr; QP–3351 or #; SP–2301 or #) Basic graph/numerical algorithms. Algorithms for logic/high-level synthesis. Simulation algorithms at logic/circuit level. Physical-design algorithms.


EE 5323. VLSI Design I. (3 cr; QP–3351, 3062 or #; SP–2301, 3115 or #) Combinational static CMOS circuits. Transmission gate networks. Clocking strategies, sequential circuits. CMOS process flows, design rules, structured layout techniques. Dynamic circuits, including Domino CMOS and DCVS. Performance analysis, design optimization, device sizing.

EE 5324. VLSI Design II. (3 cr; QP–5571 or #; SP–5323 or #) CMOS arithmetic logic units, high-speed carry chains, fast CMOS multipliers. High-speed parallel shifter. Shifting, parallel shifters. Design for testability, including scan design and built-in self test. VLSI case studies.

EE 5327. VLSI Design Laboratory. (3 cr; QP–5358, 5572 or #; SP–4301, 5323 or #5323 or #) Lab to accompany Computer design of integrated circuits. Designs evaluated by computer simulation. Selected designs fabricated and tested in succeeding semester.

EE 5329. VLSI Digital Signal Processing Systems. (3 cr; QP–5572 or #; SP–5323 or #5323 or #) Programming and design of linear time-invariant systems. Data-flow representation. Architecture transformations. Low-power design. Architectures for two’s complement/unsigned representation, carry-save, and canonical signed digit. Scheduling/allocation for high-level synthesis.

EE 5333. Analog Integrated Circuit Design. (3 cr; QP–3062, grad student or #; SP–3115, grad student or #) Fundamental circuits for analog signal processing. Design issues and techniques associated with MOS/BJT devices. Design/testers of circuits. Selected topics (e.g., modeling of basic IC components, design of operational amplifier or comparator or analog sampled-data circuit filter).

EE 5361. Computer Architecture and Machine Organization. (3 cr; QP–5351, 3352, SP–2301, 2361, SCI5201) Introduction to computer architecture. Aspects of computer systems, such as pipelining, memory hierarchy, and input/output systems. Performance metrics. Examination of each component of a complicated computer system.

EE 5371. Computer Systems Performance Measurement and Evaluation. (3 cr; QP–5582 or #; SP–5361 or #) Tools and techniques for analyzing computer hardware, software, and system performance. Benchmark programs, measurement tools, performance metrics. Deterministic and probabilistic simulation techniques, random number generation and testing. Bottleneck analysis.


EE 5391. Computing With Neural Networks. (3 cr; QP–5021 or Stat 5001 or #; SP–5025 or Stat 5011 or #) Neural networks as a computational model; connections to AI, statistics and model-based computation; associative memory models, neural networks and matrix computation; Hopfield networks; supervised networks for classification and prediction; unsupervised networks for data reduction; associative recognition and retrieval, optimization, time series prediction and knowledge extraction.

EE 5501. Digital Communication. (3 cr; QP–5203, 3021, sr or grad in IT major or #; SP–4501, 3025, sr or grad in IT major or #) Theory and techniques of modern digital communications. Communication limits, modulation and detection; data transmission over channels with intersymbol interference; optimal and suboptimal sequence detection; equalization. Error correction coding; trellis-coded modulation; multiple access, spread spectrum techniques, radio mobile architecture, digital filters, communication, performance evaluation. Current European, North American, and Japanese wireless networks.


EE 5545. Real-Time Digital Signal Processing Laboratory. (2 cr; QP–3352, 5511, EE sr or grad in IT major or #; SP–5041) Lab. Real-time computation of digital signal processing (DSP) functions, including filtering, sample-rate change, and differential pulse code modulation; implementation on a current DSP chip. DSP chip architecture, assembly language, arithmetic, real-time processing issues; processor limitations; I/O handling.

EE 5549. Digital Signal Processing Structures for VLSI. (3 cr; QP–5511, 5541) Pipelining; parallel processing; fast convolution; FIR, rank-order, IIR, lattice, adaptive digital filters; scaling and roundoff noise; DCT, VLB/C coders; lossless coders, video compression.

EE 5551. Multiscale and Multirate Signal Processing. (3 cr; QP–5511, 5702, grad in IT major or #; SP–4541, 5531, grad in IT major or #) Multirate discrete-time systems. Bases, frames; continuous wavelet transform; scaling equations; discrete wavelet transform; applications in signal and image processing.
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EE 5581. Information Theory and Coding. (3 cr; QP–5702 or #; SP–5531 or #)
Source and channel models, codes for sources and channels. Entropy, mutual information, capacity, rate-distortion functions. Coding theorems.

EE 5585. Data Compression. (3 cr; QP–IT sr or grad or #; SP–IT sr or grad or #)
Source coding in digital communications and recording; codes for lossless compression; universal lossless codes; lossless image compression; scalar and vector quantizer design; loss source coding theory; differential coding; trellis codes; transform and subband coding; analysis/synthesis schemes.

EE 5601. Introduction to RF/Microwave Engineering. (3 cr; QP–3111, IT sr or grad in IT major; SP–4601, IT sr or grad)

EE 5602. RF/Microwave Circuit Design. (3 cr; QP–5604; SP–5601 or equiv)
Transmission lines, network analysis concepts. CAD tools for passive/active designs. Diode based circuit designs (detectors, frequency multipliers, mixers). Transistor based circuit design (amplifiers, oscillators, mixers/oscillators).

EE 5611. Plasma-Aided Manufacturing. (4 cr; QP–Upper div IT or grad, ME 3303, ME 3305; SP–Upper div IT or grad, ME 3321, ME 3322 or equiv; SP–5361)
Manufacturing using plasma processes; plasma properties as a processing medium; plasma spraying, welding and microelectronics processing; process control and system design; industrial speakers; a cross-disciplinary experience between heat transfer design issues and manufacturing technology.

EE 5613. RF/Microwave Circuit Design Laboratory. (2 cr; QP–5604; SP–5601)
Scattering parameters, planar lumped circuits, transmission lines, RF/microwave substrate materials, matching networks/tuning elements, resonators, filters, combiners/dividers, coupled inductors, transformers.

EE 5616. Antenna Theory and Design. (3 cr; QP–5604; SP–5601 or concurrent registration in 5601)
Antenna performance parameters, vector potential/radiation integral, wire antenna structures, broadband antenna structures, microstrip/ aperture theory, antenna measurement concepts.

EE 5621. Physical Optics. (3 cr; QP–3011 or #; SP–3015 or #)
Physical optics principles, including Fourier analysis of optical systems and images, scalar diffraction theory, interference, and coherence theory. Applications discussed include diffraction optical elements, holography, astronomical imaging, optical information processing, and microoptics.

EE 5622. Physical Optics Laboratory. (1 cr; QP–5625; SP–5621 or #5621)

EE 5624. Optical Electronics. (4 cr; QP–3111, SP–3601 or Phys 3002 or #)
Fundamentals of lasers, including propagation of Gaussian beams, optical resonators, and theory of laser oscillators. Polarization optics, electro-optic, acousto-optic modulation, nonlinear optics, and phase conjugation.

EE 5627. Optical Fiber Communication. (3 cr; QP–3011, 3111 or # SP–3015, 3601 or #)

EE 5629. Optical System Design. (2 cr; QP–IT sr or grad; SP–IT sr or grad)

EE 5632. Photonic Communication Devices and Systems. (3 cr; QP–5624 or equiv or #)
Primary solid-state components using optical communication systems. Semiconductor lasers, detectors, and optical fibers. Basic optoelectronic properties of III-V semiconductors: band structure, optical transitions, heterostructures. LEDs, semiconductor lasers, detectors. Optical network components/systems: fibers, amplifiers, power, system architectures.

EE 5653. Physical Principles of Magnetic Materials. (3 cr; QP–IT grad or #; SP–IT grad or #)
Physics of diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism; ferromagnetic phenomena; static and dynamic theory of magnetic materials; magnetostriction, magnetoelastic properties, and magnetization dynamics; magnetic material applications.

EE 5655. Magnetic Recording. (3 cr; QP–IT grad or #; SP–IT grad or #)
Magnetic fundamentals, recording materials, idealized models of magnetic records/reproduction, analytic models of magnetic record heads, sinusoidal magnetic recording, digital magnetic recording, magnetic recording heads/media, digital recording systems.

EE 5657. Physical Principles of Thin Film Technology. (4 cr; QP–IT sr or grad student or #; SP–IT sr or grad student or #)

EE 5705. Advanced Electric Drives. (3 cr; QP–5300, 5322 or #; SP–4701)
D-q axis analysis of salient-pole synchronous motor drives; vector-controlled induction motor drives, sensor-less drives, voltage space-vector modulation techniques, current-source inverters, reluctance drives; power quality issues. Integrated software lab.

EE 5721. Power Generation Operation and Control. (3 cr; QP–5802 or #; SP–4721)
Engineering aspects of power system operation; economic analysis of generation plants and scheduling to minimize total cost of operation; scheduling of hydro resources and thermal plants with limited fuel supplies; loss analysis and secure operation; state estimation and optimal power flow; power system organizations.

EE 5725. Power Systems Engineering. (3 cr; QP–3010, 5300, 5310 or #; SP–4721)
Reliability analysis of large power generation and transmission systems; writing programs for state-by-state analysis and Monte Carlo analysis; power system protection systems, circuit current calculations, short circuit detection, isolating faulted components; characteristics of protection components.

EE 5741. Advanced Power Electronics. (3 cr; QP–5814 or #; SP–4741)

EE 5811. Biomedical Instrumentation. (3 cr; QP–IT sr or life-science sr or grad student; SP–IT sr or life-science sr or grad student)

EE 5821. Biological System Modeling and Analysis. (3 cr; QP–IT sr or life-science sr or grad; SP–IT sr or life-science sr or grad)
Purpose of biological system modeling; advantages, limitations, special problems. Models of nerve excitation and propagation. Biological control systems; respiratory and cardiovascular systems. Sensory organs and theories of perception. Limbs and locomotion.

EE 5940. Special Topics in Electrical Engineering I. (1-4 cr; QP– #; SP– #)
Special topics in electrical and computer engineering. Topics vary.

EE 5950. Special Topics in Electrical Engineering II. (1-4 cr; QP– #; SP– #)
Special topics in electrical and computer engineering. Topics vary.

EE 5960. Special Topics in Electrical Engineering III. (1-4 cr; QP– #; SP– #)
Special topics in electrical and computer engineering. Topics vary.

Emergency Health Services (EHS)

EHS 4011. Concepts of Emergency Health Services. (3 cr; A-F only)
Emergency medical system (EMS). Its impact on all aspects of U.S. culture. Basic practices generalized across systems. Comprehensive review of components required for effective EMS. Historical perspective, medical-legal concerns, medical oversight, accountability, scope of practice, communications/transportation, rural vs. urban issues, disaster management.

EHS 4021. EMS Planning and Fiscal Management. (3 cr; A-F only)
Fundamentals of planning, fiscal, and process management as related to emergency medical systems (EMS). Regulatory requirements, EMS delivery models, contract negotiations, budgeting, scenario planning.

EHS 4112. First Responder for Coaches and Athletic Trainers. (3 cr; A-F only)

EHS 4999. Practicum. (3 cr; QP–EHS; SP–EHS; A-F only)
Project in student’s employing organization or project in organization providing internship or integration of projects from previous coursework or development of program-related project.

EHS 5031. Basic Principles of Research. (3 cr; A-F only)
Basic principles of research in emergency health services.

EHS 5031. Basic Principles of Research. (3 cr; A-F only)
Basic principles of research in emergency health services.
Course Descriptions

English as a Second Language (ESL)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

ESL 0100. TOEFL Preparation. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Describes the format of the TOEFL test. Focuses on strategies for improving skills for each section of the test.

ESL 0200. Pronunciation Workshop. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Individual attention to specific areas of spoken language including intonation, rhythm, and segments.

ESL 0040. Skills Enhancement. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Student will focus on specific areas of their English which need improvement.

ESL 0800. English Through Literature. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) An advanced course designed for students who want further practice in reading, listening, speaking and writing for non-academic purposes.

ESL 0090. English Through Music. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Student will learn English vocabulary and culture through folk songs and by looking at popular music in various decades.

ESL 1000. Topics in American Culture. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will learn about areas of U.S. culture such as American humor, religions, ethnic groups, lifestyles, and popular culture.

ESL 0111. Beginning Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Introduces and reviews grammatical structures with attention to meaning, use, and form.

ESL 0121. Beginning Reading/Composition. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Reading is emphasized. Reading speed, skimming and scanning, fundamentals of spelling, punctuation, paragraphing, and basic organization. Writing exercises and free writing.

ESL 0131. Beginning Oral Skills. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Focuses on the ability to communicate in English in everyday situations. Listening and speaking are emphasized.

ESL 0181. Beginning Integrated English. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Reading, writing, speaking, listening, grammar.

ESL 0191. Beginning Skills Enhancement. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Practice in speaking in structured and semi-structured situations with special attention to basic regularities in pronunciation.

Improving basic English language skills through work in computer/language lab. Focused activities for individual learners.

ESL 0193. Pronunciation. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Addresses important aspects of English pronunciation necessary to improve comprehensibility and reduction of foreign accents. Includes work on enunciation; word, phrasal, and sentence stress; intonation; linking; thought groups; and rhythm.

ESL 0200. Understanding American Universities. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Strategies for success in academic classes including vocabulary development, lecture comprehension, and textbook reading; application of reading skills and the reading of supporting unadapted material.

ESL 0211. High Beginning Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Reviews and adds to students’ skills with basic structures. Focuses on increasingly complex structures with attention to form, meaning, and use; practice of structure in speaking and writing activities.

ESL 0221. High Beginning Reading/Composition. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Reading. Ability to communicate in English in everyday situations. Emphasis on listening and speaking, and increasing vocabulary and fluency in spoken English.

ESL 0300. Computer Lab: Intro to Computer Basics. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will learn basic word processing.

ESL 0310. Computer Lab: Using the Internet for Language Learning. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will complete projects on e-mail and the internet.

ESL 0311. Low Intermediate Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Reviews and adds to students’ skills with basic structures. Emphasizes increased complexity in structure with attention to form, meaning, and use; practice of structures used in controlled speaking and writing situations.

ESL 0321. Low Intermediate Reading/Composition. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Reading for main ideas and supporting ideas with increased speed; vocabulary development through study of word form and use and dictionary. Writing fundamentals; organization and writing as a process.

ESL 0331. Low Intermediate Oral Skills. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Practice in speaking in structured and semi-structured situations with special attention to basic regularities in pronunciation.

ESL 0400. Library and Research Skills. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will learn the basics of using the university library system for research purposes.

ESL 0411. Intermediate Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Development of fluency and accuracy; language for specific functions; communication strategies; standard forms of organization for academic lectures; understanding natural conversational speech.

ESL 0500. Community Service Learning. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will learn about and participate in community service projects.

ESL 0511. High Intermediate Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Reviews and adds to repertoire of structures with attention to meaning, use; emphasizes verb phrase and control of grammar in writing.

ESL 0521. High Intermediate Reading/Composition. (0 cr; S-N only) Reading adapted as well as adapted passages; efficiency, vocabulary, drawing inferences, identifying point of view, using knowledge of organization to aid understanding, writing process, academic-style assignments.

ESL 0531. High Intermediate Oral Skills. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) English pronunciation, vocabulary, pronunciation, word formation and use of dictionary. Develops fluency in everyday situations and in academic situations; special attention to communication strategies; standard forms of organization for academic lectures by introducing standard forms of organization and note-taking skills. Students also work on understanding natural conversational speech using a variety of authentic materials.

ESL 0600. International Business Communication. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) How to write business letters in English. E-mail, voice mail for business.

ESL 0611. Advanced Grammar. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Focuses on difficult areas of grammar and on providing students with opportunities to work on them. Meaning, use and form are emphasized with increased emphasis on complex sentence patterns.

ESL 0621. Advanced Reading Comprehension. The Written Word. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Focuses on improving reading efficiency, including strategy development, as well as vocabulary skill building. Some focus on using reading to support academic writing.
ESL 0622. Advanced Reading/Composition: The Written Word. (0 cr; SP-0622; S-N only) Continuation of ESL 0621.

ESL 0641. Advanced Listening Comprehension. (0 cr; QP–Nonnative English speaker; see Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Lecture comprehension with attention to note taking, recognizing main ideas, support, and determining the attitude of the speaker toward the subject; comprehension of complex information presented in a nonlecture format, as in television documentaries.

ESL 0651. Advanced Speaking/Pronunciation. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Emphasizes the use of spoken English in academic settings as well as in conversation. Pronunciation focuses on the production of grammatically sophisticated structures.

ESL 0661. Advanced Reading. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Students will work on comprehending authentic texts of significant lengths. Develop strategies to apply in academic reading.

ESL 0671. Advanced Composition. (0 cr; QP–Nonnative English speaker. See Minnesota English Center for override; SP–Nonnative English speaker. See Minnesota English Center for override; S-N only) Skills needed at every stage of the writing process: finding a topic, determining an approach to the topic, planning and drafting a composition, revising, and editing. Setting one’s writing to audience and topic, and looking at one’s own writing critically.

ESL 0700. Topics in the Media. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) News media as means of English improvement and as source of information/entertainment. Major international news via radio broadcasts, newspaper, and other news sources. Understanding American culture and developing listening/speaking skills using American movies/television.

ESL 0711. Grammar Through Writing. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Focuses on production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0712. Grammar Through Writing. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0713. Grammar Through Writing. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Production of grammatically sophisticated structures in writing. Students edit their assignments.

ESL 0721. High Advanced Reading/Composition. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Emphasizes reading for academic purposes. Focus on comprehension of scholarly reading selections and on increasing reading efficiency. Focus on writing process, academic-style assignments.

ESL 0731. High Advanced Oral Skills. (0 cr; SP–0731; S-N only) Continuation of ESL 0731.

ESL 0732. High Advanced Oral Skills. (0 cr; SP–0732; S-N only) Containment of complex information presented in a nonlecture format. In these skills, the main emphasis is on specific comprehension, paraphrasing, summarizing text, quoting and citing sources, understanding writer’s perspective.

ESL 0733. High Advanced Listening Comprehension. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Formal listening comprehension with special attention to note taking, recognizing main ideas, support, and determining the attitude of the speaker toward the subject; comprehension of complex information presented in a wide variety of authentic materials.

ESL 0741. High Advanced Listening Comprehension. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Lecture comprehension with special attention to note taking, recognizing main ideas, support, and determining the attitude of the speaker toward the subject; comprehension of complex information presented in a nonlecture format, as in television documentaries.

ESL 0751. High Advanced Speaking/Pronunciation. (0 cr; QP–Nonnative English speaker; see Minnesota English Center for override; SP–Nonnative English speaker; see Minnesota English Center for override; S-N only) Emphasizes use of spoken English in academic settings, including presentation skills and discussion skills; pronunciation focuses on individual needs of students.

ESL 0761. High Advanced Reading. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Continued development of strategies to increase reading efficiency, comprehension, paraphrasing, summarizing text; quoting and citing sources; understanding writer’s perspective.

ESL 1000. English for Science and Technology. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Advanced strategies for reading scientific and technical material. Focus on reading, writing, listening, and speaking activities based on scientific and technical English.

ESL 1080. Beginning English as a Second Language: W. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Basic grammar structures. Vocabulary/reading with attention to main ideas, word forms, meaning, and use. Writing fundamentals, including sentence structure, organization. Emphasizes ability to comprehend/communicate in everyday situations.

ESL 1082. High Beginning English as a Second Language. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) English grammar, reading, writing, speaking/ pronunciation, listening at high advanced level. Basic grammar structures. Reading passages of increased difficulty. Writing fundamentals, organization, comprehension/communication of everyday English in structured/semi-structured situations.

ESL 1083. Low Intermediate English as a Second Language: R1. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) English grammar, reading, writing, speaking/ pronunciation, listening at a low-intermediate level. Grammatical structures with attention to form, meaning, and use. Writing. Reading fluency, efficiency, vocabulary, comprehension. Critical reading. Fluency/accuracy in conversational/academic listening/speaking.

ESL 1084. High Intermediate English as a Second Language: R2. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) English grammar, reading, writing, speaking/ pronunciation, and listening at high intermediate level. Difficult areas of grammar. Reading for academic purposes or for pleasure to increase fluency. Writing skills. Comprehension of lecture information and of complex information in non-lecture formats. Spoken English in academic/social situations.

ESL 1085. Advanced English as a Second Language: D1. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) English grammar, reading, writing, speaking/ pronunciation, and listening at advanced level. Active use of advanced structures in writing/speaking. Reading passages of cultural interest. Letter/journal/academic writing. Informal English for everyday purposes (idioms/reductions). Conversation, formal discussion, and presentation skills.

ESL 1086. High Advanced English as a Second Language. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) English grammar, reading, writing, speaking/ pronunciation, and listening at high advanced level. Developing strategies for expanding/activating vocabulary. Developing reading speed, finding main ideas, understanding supporting details. Letter/journal/academic writing through essays and research papers. Practice with idioms, reduced forms.

ESL 1087. English as a Second Language for Admitted Students: A1. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) English grammar, reading, writing, speaking/ pronunciation, and listening at high advanced level. Developing strategies for expanding/activating vocabulary. Developing reading speed, finding main ideas, understanding supporting details. Letter/journal/academic writing through essays and research papers. Practice with idioms, reduced forms.

ESL 1091. Fundamentals in English as a Second Language. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Basic knowledge/skills needed for daily communication in spoken English. Grammatical structures explained with reference to their uses in social situations. Pronunciation.

ESL 1092. Fundamentals in English as a Second Language. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Basic knowledge/skills needed for daily communication in spoken English. Grammatical structures explained with reference to their uses in social situations. Pronunciation.

ESL 1093. Developing Fluency in English as a Second Language. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Communication skills for social, academic, and professional purposes. Emphasizes listening/speaking. Content drawn from mass media.

ESL 1094. Developing Fluency in English as a Second Language. (0 cr; QP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Communication skills for social, academic, and professional purposes. Emphasizes listening/speaking. Content drawn from mass media.

ESL 1095. Developing Fluency in English as a Second Language. (0 cr; SP–Nonnative speaker of English; see Minnesota English Center for override; S-N only) Communication skills for social, academic, and professional purposes. Emphasizes listening/speaking. Content drawn from mass media.
**Course Descriptions**

**ESL 0937. International Business Communication.** (0 cr; SP–Non-native speaker of English; see Minnesota English Language Center for override; S-N only)
Oral communication in a business setting. English as used in international trade, finance, and marketing. Listening/speaking skills for business materials. E-mail, voice mail. Writing business letters.

**ESL 0971. Advanced Academic Writing.** (0 cr; OP–A)
Grad student, non-native speaker of English, satisfactory score on (EPT or MNBatt or TOEFL); SP–A, graduate student, non-native speaker of English, satisfactory score on (EPT or MNBatt or TOEFL); S-N only
Introduction to the use of library system and to types of writing required in graduate school courses. Developing/organizing ideas, drafting, revising/editing papers, writing essay exams.

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**English: Creative and Professional Writing (EngW)**

**Department of English Language and Literature College of Liberal Arts**

**EngW 1101W. Introduction to Creative Writing.** (4 cr)
Writing poetry and prose. Small group workshops and lecture presentations by visiting writers. For those who want to try creative writing, improve reading skills, and learn more about the creative process.

**EngW 1102. Introduction to Fiction Writing.** (3 cr)
Beginning instruction in the art of fiction: characterization, plot, dialogue, and style. Writing exercises to help students generate ideas. Students read and discuss published fiction as well as their own writing.

**EngW 1103. Introduction to Poetry Writing.** (3 cr)
Beginning instruction in the art of poetry. Discussion of student poems and contemporary poetry, ideas for generating material, and writing exercises both in and out of class.

**EngW 1104. Introduction to Nonfiction Writing.** (3 cr)
Beginning instruction in the art of literary nonfiction, including the memoir. Discussion of student work and contemporary creative nonfiction, ideas for generating material, and writing exercises.

**EngW 3101. Intermediate Creative Writing.** (3 cr; SP–1101 or A)
For students with experience in creative writing. Exercises, experiments, assigned readings, and discussion of students’ work.

**EngW 3102. Intermediate Fiction Writing.** (3 cr; SP–1101 or 1102 or A)
Exercises, experiments, assigned readings, discussion of student work.

**EngW 3103. Advanced Fiction Writing.** (4 cr; SP–1101 or 1102 or 1103 or 1104 or A)
Advanced workshop.

**EngW 3104. Advanced Poetry Writing.** (4 cr; SP–1101 or 1102 or A)
Advanced workshop.

**EngW 3105. Advanced Nonfiction Writing.** (4 cr; SP–1101 or 1103 or 1104)
Advanced workshop. Contact creative writing program for specific description.

**EngW 5102. Advanced Fiction Writing.** (4 cr; [max 8 cr; SP–A])
Advanced workshop for graduate students with considerable experience in writing fiction.

**EngW 5103. Advanced Fiction Writing.** (4 cr; [max 8 cr; SP–A])
Advanced workshop for students with considerable experience in writing fiction.

**EngW 5104. Advanced Poetry Writing.** (4 cr; [max 8 cr; SP–A])
Advanced workshop for graduate students with considerable experience in writing poetry. An opportunity to explore new poetic possibilities and to read widely in contemporary poetry and poetics.

**EngW 5105. Advanced Poetry Writing.** (4 cr; [max 8 cr; SP–A])
Advanced workshop for students with considerable experience in writing poetry. An opportunity to explore new poetic possibilities and to read widely in contemporary poetry and poetics.

**EngW 5106. Advanced Literary Nonfiction Writing.** (4 cr; [max 8 cr; SP–A])
Advanced workshop for graduate students with considerable experience in writing literary nonfiction.

**EngW 5107. Advanced Fiction Writing.** (4 cr; [max 16 cr; SP–A])
Advanced workshop for students with considerable experience in writing literary nonfiction.

**EngW 5110. Topics in Advanced Fiction Writing.** (4 cr; [max 16 cr; SP–A])
Special topics in fiction writing. Topics specified in Class Schedule.

**EngW 5120. Topics in Advanced Poetry.** (4 cr; [max 16 cr; SP–A])
Special topics in poetry writing. Topics specified in Class Schedule.

**EngW 5130. Topics in Advanced Creative Writing.** (4 cr; [max 16 cr; SP–English major or A])
Advanced workshop that might include work in more than one genre.

**EngW 5201. Journal and Memoir Writing.** (3 cr)
Using memory in writing, from brainstorming to drafting to revising, in several genres (poems, traditional memoir essays, fiction). How diverse cultures shape memory differently.

**EngW 5202. Journal and Memoir Writing II: Memory in Different Modes.** (3 cr; A-F only)
Using memory in writing, from brainstorming to drafting to revision, in several genres (poems, traditional memoir essays, fiction). How diverse cultures shape memory differently.

**EngW 5204. Playwriting.** (4 cr; [max 8 cr; SP–A])
Advanced workshop. Contact creative writing program for specific description.

**EngW 5205. Screenwriting.** (4 cr; SP–A)
Advanced workshop. Contact creative writing program for specific description.

**EngW 5210. Topics in Advanced Literary Nonfiction.** (4 cr; [max 16 cr; SP–A])
Special topics in essay writing (e.g., arts reviewing, writing about public affairs, writing in personal voice). Topics specified in Class Schedule.

**EngW 5310. Reading as Writers.** (4 cr; [max 8 cr; SP–Grad student or A])
Special topics in reading fiction, literary nonfiction, poetry. Topics specified in Class Schedule.

**EngW 5401. Introduction to Editing.** (4 cr)
Beginning editing, from nature of the editor-writer relationship to manuscript reading, author querying, rewriting, style. Some discussion of copy editing. Students develop editing skills by working on varied writing samples.

**EngW 5402. Advanced Editing.** (4 cr; SP–5401, #A)
For students with advanced editing competence to further advance their skills. Workshop/seminar, editing long text and fiction, children’s literature, translations and indexes.

**EngW 5501. Minnesota Writing Project Selective Institute.** (3 cr; [max 3 cr; SP–Competitive selection for 20 educators (K-college)]
Emphasizes participants’ teaching each other best practices in writing instruction. Participants attend a retreat before beginning.

**EngW 5502. Minnesota Writing Project Open Institute.** (2 cr; SP–Teacher (K-college), [school district sponsorship or MWP approval])
Summer workshop to refine skills in writing instruction.

**EngW 5570. Minnesota Writing Project Directed Studies.** (1-3 cr; [max 3 cr; A-F only])
Current theories of writing and writing pedagogy. Topics vary. Workshop.

**EngL 5606. Literary Aspects of Journalism.** (3 cr; SP–#5606; A-F only)
Literary aspects of journalism as exemplified in and influenced by works of English/American writers past/present. Lectures, discussions, weekly papers.

**EngL 5993. Directed Study in Writing.** (1-4 cr; [max 18 cr; SP–A, LA])
Projects in writing poetry, fiction, drama, and nonfiction, or study of ways to improve writing.

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**English: Literature (EngL)**

**Department of English Language and Literature College of Liberal Arts**

**EngL 1001V. Honors: Introduction to Literature.** (4 cr; SP–§1001; honors; A-F only)
Basic techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays.

**EngL 1001W. Introduction to Literature: Poetry, Drama, Narrative.** (4 cr; SP–§1002; [EngC 1011 or equiv], 12 cr)
Basic techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays.

**EngL 1181V. Honors: Introduction to Shakespeare.** (4 cr; SP–§1181; honors; A-F only)
Survey of Shakespeare’s work, treating approximately 10 plays. Lecture.

**EngL 1181W. Introduction to Shakespeare.** (4 cr; SP–§1182)
Survey of Shakespeare’s work, treating approximately 10 plays. Lecture.

**EngL 1201V. Honors: Introduction to American Literature.** (4 cr; SP–§1201; honors; A-F only)
Chronologically/thematically based readings from American literature. Approaches to literary analysis/criticism. Social/historical contexts of authorship/reading, literary artistry/conventions. Discussion, writing.

**EngL 1201W. Introduction to American Literature.** (4 cr; SP–§1202)
Chronologically/thematically based readings from American literature. Approaches to literary analysis/criticism. Social/historical contexts of authorship/reading, literary artistry/conventions. Discussion, writing.

**EngL 1301V. Honors: Introduction to Multicultural American Literature.** (4 cr; SP–§1301; honors; A-F only)
Representative works by African American, American Indian, Asian American, Chicano/Chicana writers, chiefly from twentieth century. Social/cultural factors in America’s literary past/present.
Course Descriptions

EngL 1301W. Introduction to Multicultural American Literature. (4 cr; QR-Honors reg or A; SP–31302) Representative works by African American, American Indian, Asian American, and Chicano/Chicana writers, chiefly from 20th century. Social/cultural factors informing America’s literary past/present.

EngL 1401V. Honors: Introduction to World Literatures in English. (4 cr; SP–31401; honors; A-F only) Introduction to diverse world produced in English outside the United States and Britain. Works represent different cultures, but treat concerns derived from a common post-colonial legacy.

EngL 1401W. Introduction to World Literatures in English. (4 cr; OP–Honors reg or A; SP–31402) Diverse works produced in English outside the United States and Britain. Works represent different cultures, but treat concerns derived from common post-colonial legacy.


EngL 1910W. Topics: Freshman Seminar. (3 cr; SP–Fr or max 36 cr; A-F only) Topics specified in Class Schedule.

EngL 3001V. Honors: Textual Interpretation, Analysis, and Investigation. (4 cr; SP–33001; honors; EngL [major or minor]; A-F only) Training/practice in analyzing various literary forms. Emphasizes poetry. Argument, evidence, and documentation in literary papers. Introduction to major developments in contemporary criticism.

EngL 3001W. Textual Interpretation, Analysis, and Investigation. (4 cr; OP–EngL [major or minor or pre-major]; SP–3801; EngL [major or minor or pre-major]; A-F only) Training/practice in analysis of various literary forms. Emphasizes poetry. Use of argument, evidence, and documentation in literary papers. Introduction to major developments in contemporary criticism.

EngL 3002. Modern Literary Criticism and Theory. (3 cr; SP–3802; 12 cr in other literature courses) Problems of interpretation/criticism. Questions of meaning, form, authority, literary history, social significance.

EngL 3002H. Honors: Modern Literary Criticism and Theory. (3 cr; SP–34002; CA honors) Problems of interpretation/criticism. Questions of meaning, form, authority, literary history, social significance.

EngL 3003W. Historical Survey of British Literatures I. (4 cr) An introductory historical survey of British literature and culture from the Anglo-Saxon invasions through the end of the 18th century.

EngL 3004W. Historical Survey of British Literatures II. (4 cr) An introductory historical survey of British literature and culture in the 19th and 20th centuries. Includes Romantic, Victorian, and Modernist authors, such as Wordsworth, Keats, Tennyson, the Brontës, Austen, Dickens, Wilde, Yeats, Woolf, and Thomas.

EngL 3005W. Survey of American Literatures and Cultures I. (4 cr; A-F only) Readings in American literature from first European contact through colonial times, and to the mid-19th century. Readings in several genres will include world-famous classics as well as the work of people of color and women. Attention to historical contexts.

EngL 3006W. Survey of American Literatures and Cultures II. (4 cr) Readings from the mid-19th to the mid-20th century; including the realists’ and regionalists’ response to the growth of industrial capitalism, Modernism in the 1920s, and the issues which united and divided the country throughout the 20th century.

EngL 3007. Shakespeare. (3 cr; OP–EngL [major or pre-major] or SP–33007; EngL [major or minor or pre-major]; A-F only) Plays from all of Shakespeare’s periods, including at least A Midsummer Night’s Dream, Hamlet, the history plays, King Lear, Macbeth, The Tempest, Twelfth Night, Antony and Cleopatra, Othello, and The Winter’s Tale.

EngL 3007H. Honors: Shakespeare. (3 cr; OP–CLA honors; SP–33007; CLA honors) Plays from all of Shakespeare’s periods, including at least A Midsummer Night’s Dream, Hamlet, the history plays, King Lear, Macbeth, The Tempest, Twelfth Night, Antony and Cleopatra, Othello, and The Winter’s Tale.

EngL 3100. Studies in Poetry. (3 cr [max 9 cr]) Special topics related to reading poetry in various interpretive contexts.


EngL 3102H. Honors: Studies in Narrative. (3 cr; SP–33200; honors; A-F only) Issues related to reading/understanding narrative in various interpretive contexts. Topics may include nineteenth-century English (American, Anglphone) novel; narrative; or techniques of the novel. Topics specified in Class Schedule.

EngL 3103. Studies in Drama. (3 cr [max 9 cr]) Topics may include English Renaissance tragedy, English Restoration and 18th century, or American drama by writers of color; single-author courses focused on writers such as Tennessee Williams and Eugene O’Neill, or issues and themes, such as gender and performance.

EngL 3104. Studies in Film. (3 cr [max 9 cr]) Topics related to English Renaissance tragedy, English Restoration and 18th century, or American drama by writers of color; single-author courses focused on writers such as Tennessee Williams and Eugene O’Neill, or issues and themes, such as gender and performance.

EngL 3105. Studies in Literature and the Other Arts. (3 cr [max 9 cr]) Examines literature’s role in conjunction with other arts including music, the visual arts, dance, etc. Topics specified in Class Schedule.

EngL 3106. Studies in Literature and Cultural Modes. (3 cr [max 9 cr]) Modes of literary expression and representation that transcend conventional demarcations of genre and historical periods. Topics may include horror, romance, mystery, comedy, and satire.

EngL 3110. Medieval Literatures and Culture. (3 cr [max 9 cr]) Major and representative works of the Middle Ages. Topics specified in the Class Schedule.

EngL 3111. Survey of English Literature I, Transition. (3 cr; A-F only) Historical survey of major figures, movements, and trends in English literature. Chaucer to Marvell, including Spenser, Shakespeare, and Donne.

EngL 3112. Survey of English Literature II, Transition. (3 cr; A-F only) Historical survey of major figures, movements, and trends in English literature. Milton to Johnson, including Dryden, Swift, and Pope.

EngL 3113. Survey of English Literature III, Transition. (3 cr; A-F only) Historical survey of major figures, movements, and trends in English literature. Blake to Yeats, including Wordsworth, Coleridge, Keats, Tennyson, and the Brownings.

EngL 3131. Advanced Shakespeare. (3 cr; SP–3307 or #) Intensive study of two to four plays, exploration of less familiar plays or of other works including the Sonnets, performance as interpretation with comparative analysis of multiple performances of a play or plays, critical study of multiple-text plays.


EngL 3151. Romantic Literatures and Cultures. (3 cr) British literature written between 1780 and 1830. Examine the concept of Romanticism, the effects of the French Revolution on literary production, and the role of the romantic artist.

EngL 3161. Victorian Literatures and Cultures. (3 cr) The literature of the British Victorian period (1832–1901) in relation to its cultural and historical contexts. Typical authors include Tennyson, the Brownings, Dickens, Arnold, Hopkins, and the Queen.

EngL 3171. Modern British Literatures and Cultures. (3 cr) Survey of principal writers, intellectual currents, conventions, genres and themes in Britain from 1950 to present. Typically included are Beckett, Golding, Kingsley and Martin Amis, Murdoch, Larkin, Hughes, Heaney, Lessing, Shaffer, Stopford, Fowles, and Drabble.

EngL 3180. Contemporary Literatures and Cultures. (3 cr) Examines issues related to the reading and understanding of British, American, and Anglphone fiction and poetry in a variety of interpretive contexts.

EngL 3211. American Poetry to 1900. (3 cr) Poets from the Puritans to the end of the 19th century. The course attends to the intellectual and cultural background of the poets, poetic theory, and form.

EngL 3212. American Poetry from 1900. (3 cr) Famous and lesser-known poems from the Modernist era, the time of Frost, HD, Pound, Eliot and the Harlem Renaissance. The course attends to the intellectual and cultural background of the poems, poetic theory and form.

EngL 3221. American Novel to 1900. (3 cr) Novels from the early Republic through Poe, Hawthorne, Melville, and Stowe, to the writers of the end of the 19th century (e.g., Howells, Twain, James, Chopin and Crane). The development of a national literature, tension between realism and romance, and changing role of女人 as writers and as fictional characters.

EngL 3222. American Novel from 1900. (3 cr) Novels from early 1900’s realism through the Modernists (e.g., Faulkner, Hemingway, Fitzgerald) to more recent writers (e.g., Ellison, Bellow, Erdrich, Pynchon). Stylistic experiments, emergence of voices formerly under-represented groups, and novelists’ responses to a technologically changing society.

EngL 3231. American Drama. (3 cr) Representative dramas from the 18th through 20th centuries. Topics include the staging of national identities, the aesthetics of modern and contemporary drama, and the production concerns of mainstream, regional, and community theaters.

EngL 3300. Topics in Multicultural American Literatures. (3 cr [max 9 cr]) The writings of specific ethnic groups with an emphasis on historical or cultural context. Topics may include American minority drama, the Harlem Renaissance, Asian-American literature and film, African-American women writers. Topics specified in Class Schedule.

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EngL 3330. Gay, Lesbian, Bisexual, and Transgender Literature. (3 cr; max 9 cr)
   Explore literature and culture produced by and about gay, lesbian, bisexual, and transgendered people. Emphasis on the importance of examining materials usually falsified or ignored in earlier literary and cultural studies and how traditional accounts need to be revised in light of significant contributions of GLBT people to literature and culture.

EngL 3350. Women Writers. (3 cr; max 9 cr)
   Groups of writers in the 19th and/or 20th centuries. Will focus either on writers from a single country or be comparative in nature. The course will be organized thematically or according to topics of contemporary and theoretical interest.

EngL 3350H. Honors: Women Writers. (3 cr; SP–§3350; CLA honors or A)
   Groups of writers in 19th or 20th century. Either focuses on writers from a single country or is comparative. Organized thematically or according to topics of contemporary/theoretical interest.

EngL 3400. Post-Colonial Literatures. (3 cr; max 9 cr)
   Varied topics in post-colonial literatures. Typical novelists include Chinua Achebe, TS Eliot, Danga Dangarema, Fadila Faqir, Salman Rushdie, filmmaker Kidlat Tahimik, and “dub” poets Mataburaka and Jean Binta Breeze.

EngL 3581. Folklore. (3 cr)
   Folklore genres such as proverbs, prose narratives (tales and legends), folklore, and games. Outline of the history of folklore.

EngL 3591. Introduction to African American Literature. (3 cr)
   Afro-American autobiography, fiction, essay, poetry, drama, and folklore from the late 18th century to the present.

EngL 3870. Figures in English and North American Literature. (3 cr; max 9 cr)
   Topics specified in the Class Schedule.

EngL 3880. General Topics. (3 cr; max 9 cr)
   Topics specified in the Class Schedule.

EngL 3881. London Seminar. (3 cr; SP–Completion of 3xx level composition requirement, A)
   Broad topic of literary investigation and integrating several areas of study. Team taught.

EngL 3882V. Honors: Senior Paper. (2 cr; SP–§3882; English major, honors, A, A-F only)
   Senior paper.

EngL 3882W. Senior Paper. (2 cr; SP–§3884; English major, A-F only)
   Senior paper.

EngL 3883V. Honors Thesis. (3 cr; SP–Honors summa cum laude candidacy in EngL; consent of EngL honors adviser; A-F only)
   Honors thesis. See guidelines available from English honors adviser.

EngL 3960. Junior-Senior Seminar. (3 cr; SP–English major, [r or s], completion of University writing requirement, A)
   Intensive study of major literary topic, figure, period, or genre, or of an English language topic. Topics specified in Class Schedule.

EngL 3980. Directed Instruction. (1-6 cr; SP–#; A, A-F only)
   Directed study arranged between student and advising faculty member.

EngL 3992. Directed Reading. (1-15 cr; max 15 cr; SP–#; A, A-F only)
   Guided individual reading.

EngL 3993. Directed Study. (1-8 cr; SP–#; A, A-F only)
   Guided individual study.

EngL 3994. Directed Research. (1-15 cr; max 15 cr; SP–#; A, A-F only)
   Directed individual research. Qualified students work on a tutorial basis.

EngL 5001. Introduction to Methods in Literary Studies. (3 cr; SP–Grad or #)
   End/methods of literary research, including professional literary criticism, analytical bibliography, and textual criticism.

EngL 5002. Introduction to Literary and Cultural Theory. (3 cr; SP–Grad or #)
   Approaches to practical/theoretical problems of literary history/genre.

EngL 5120. Reading in American Literature. (3 cr; max 9 cr; SP–Grad or #)
   General background/preparation for advanced graduate study. Readings cover either a wide historical range (e.g., 19th-century gothic), a genre (e.g., the novel), or a major literary movement (e.g., Modernism).

EngL 5130. Readings in American Minority Literature. (3 cr; max 9 cr; SP–Grad or #)
   Contextual readings of 19th-/20th-century American minority writers. Topics specified in Class Schedule.

EngL 5140. Post-Colonial Literatures. (3 cr; max 9 cr; SP–Grad or #)
   Selected readings in post-colonial literatures. Topics specified in Class Schedule.

EngL 5150. Readings in Criticism and Theory. (3 cr; max 9 cr; SP–Grad or #)

EngL 5210. Middle English Literature and Culture. (3 cr; max 9 cr; SP–Grad student or #)
   Wide reading in literature of period. Relevant scholarship/criticism. Topics vary. See Class Schedule.

EngL 5230. Early Modern Literature and Culture. (3 cr; max 9 cr; SP–Grad or #)
   Topical readings in early modern poetry, prose, fiction, and drama. Attention to relevant scholarship or criticism. Prepares graduate students for work in other courses or seminars.

EngL 5250. 19th-Century Literature and Culture. (3 cr; max 9 cr; SP–Grad or #)
   19th-century British, Irish, and American literatures. Topics may include British Romantic or Victorian literatures, 19th-century American literature, important writers from a particular literary school, or a genre (e.g., the novel). Readings.

EngL 5270. 20th-Century Literature and Culture. (3 cr; max 9 cr; SP–Grad student or #)
   20th-century British, Irish, or American literatures, or topics involving literatures of two nations. Focus either on a few important writers from a particular literary school or on a genre (e.g., drama). Topics specified in Class Schedule.

EngL 5291. Contemporary Literature and Culture. (3 cr)

EngL 5330. Topics in Drama. (3 cr; max 9 cr; SP–Grad student or #)
   Wide reading in literature of a given period or subject. Prepares students for work in other courses/seminars. Relevant scholarship/criticism. Topics specified in Class Schedule.

EngL 5581. Folklore I. (3 cr; SP–Grad student or #)
   Folklore genres such as proverbs, oral prose narratives (tales/legends), folklore, and games. Manner in which folklore is transmitted/changed. Focus on how folklore functions in literature, the mass media, and everyday life.

EngL 5582. Folklore II. (3 cr; SP–§5581, grad student or #)
   Training in collection of folklore materials.

EngL 5800. Practicum in the Teaching of English. (2 cr; max 9 cr; SP–Grad student, S-N only)
   Discussion of and practice in recitation, lecture, small groups, tutoring, individual conferences, and evaluation of writing/reading. Emphasizes theory informing effective course design/teaching for different disciplinary goals. Topics vary. See Class Schedule.

EngL 5992. Directed Readings/Study/Research. (1-15 cr; max 15 cr; SP–Grad student or #; A, A-F only)
   Guided individual reading.

English: Writing, Rhetoric, and Language (EngC)

Department of English Language and Literature

College of Liberal Arts

EngC 1001. Preparation for University Writing. (4 cr; SP–Category 4 placement; some sections may be limited to ESL students)
   Guided writing practice in prewriting, drafting, and revising as well as grammar, sentence structure, and paragraphing. For students who are not fully prepared for academic writing. Weekly meetings with a tutor in the Student Writing Center required.

EngC 1011. University Writing and Critical Reading. (4 cr; SP–§1011; placement in category 2 or 3; some sections may be limited to ESL)
   Critical reading/interpretation of selected texts. Research in various types of resources. Writing through several drafting steps. Finished writing is reviewed/editied to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1011H. Honors: University Writing and Critical Reading. (4 cr; SP–§1011 honors; placement in category 2 or 3; A-F only)
   Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised/editied to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1012. University Writing and Critical Reading, Emphasis on Cultural Diversity. (4 cr; SP–Placement in category 2 or 3; some sections may be limited to ESL students)
   Extended practice in writing on topics concerning cultural diversity. Course projects involve critical reading and interpretation of selected texts, research in various types of resources, and writing that moves through several drafting steps. Finished writing is revised and edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1012H. Honors: University Writing and Critical Reading, Emphasis on Cultural Diversity. (4 cr; SP–Placement in category 2 or 3; A-F only)
   Extended practice in writing on topics concerning cultural diversity. Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1013. University Writing and Critical Reading, Emphasis on Environment. (4 cr; SP–Placement in category 2 or 3; some sections may be limited to ESL students)
   Writing on topics concerning the environment. Critical reading/interpretation of selected texts. Research in various types of resources. Writing through several drafting steps. Finished writing is revised/edited to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1013H. Honors: University Writing and Critical Reading, Emphasis on Environment. (4 cr; SP–§1013; honors; placement in category 2 or 3; A-F only)
   Writing on topics concerning the environment. Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised/editied to meet university-level standards of persuasiveness, precision, and correctness.

EngC 1014. University Writing and Critical Reading, Emphasis on Public Ethics. (4 cr; SP–Some sections may be limited to ESL students)
   Writing on topics concerning citizenship and public ethics. Projects involve critical reading and
Honors; A-F only

Significant commitment to service learning with service agencies.

Service-learning component requires tutoring (min. 2 credit hours).

Regional and rural dialects, pidgins, creoles and urban varieties.

Development of regional and rural dialects, pidgins, creoles, and urban varieties.

Interpretation of selected texts, research in various social contexts. Gender and writing. Patterns of women's/men's speech in specific social contexts. Gender and writing.

Development of oral/written language skills: vocabulary, manipulation of grammatical structures, speaking, listening, reading, writing. Modern Gaelic culture.


Topics specified in Class Schedule.

Surveys, compares, and contrasts assumptions of classical and contemporary rhetorical theory, especially as they influence the interdisciplinary field of composition studies.

Non-native speakers of English.

Development of oral/written language skills: vocabulary, manipulation of grammatical structures, speaking, listening, reading, writing. Modern Gaelic culture.

Introduction to major theories that inform teaching of writing in college and upper-level high school curriculums. Topics specified in Class Schedule.

Introduction to major theories that inform teaching of writing in college and upper-level high school curriculums. Topics specified in Class Schedule.

Focuses on the range of choices writers make based on audience, purpose, and context. Relies on critical reading and a variety of writing assignments to improve control over writing and the effect it will have on intended audiences.

Provides a general, non-technical understanding of the systematic, dynamic and creative nature of human language, with special application to the English language.

A-F only)

Writing on topics concerning citizenship, public ethics. Critical reading/interpretation of texts, research in various resources, writing through several drafting steps. Finished writing is revised and edited and submitted to university-level standards.

For definitions of course numbers, symbols, and abbreviations, see page 289.
**Course Descriptions**

Ent 4015. Ornamentals and Turf Entomology. (3 cr; QP–1xxx course in bioi or hort or forest resources; SP–1xxx course in bioi or hort or forest resources) Diagnosis and management of insect pests in landscape plants. Emphasis on the principles of biological control, biotechnological pesticides, and integrated pest management.

Ent 4021. Honey Bees and Insect Societies. (3 cr; QP–Biol 1009 or SP–Biol 1009 or #) Natural history, identification, and behavior of honey bees and other social insects. Evolution of social behavior, pheromones and communication, organization and division of labor, social parasitism. Lab with honey bee management and maintenance of other social bees for pollinators. Work with live bee colonies and participate in field research problems related to honey bee behavior and management.

Ent 4096. Professional Experience Program: Internship. (1-3 cr; QP–COAFES Jr or Sr, #, complete internship contract available in COAFES Career Services before registering; UC only; SP–COAFES Jr or Sr, #, complete internship contract available in COAFES Career Services before registering; UC only; S-N only) Professional experience in entomology firms or government agencies through supervised practical experience; evaluative reports and consultations with faculty advisers and employers.

Ent 4241. Ecological Risk Assessment. (3 cr; QP–Ent #; SP–#) Evaluating current/potential impact of physical, chemical, biological agents on ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction papers, final exam, small-group project.

Ent 4251. Forest and Shade Tree Entomology. (3 cr) Biology, ecology, population management of forest/shade tree insects. Emphasizes predisposing factors/integrated management. Lecture/lab. Required Saturday field trip on second weekend of semester.

Ent 4281. Livestock Entomology. (3 cr; QP–1005, 3005) or #; A-F only) Biology/management of insects, mites, ticks that affect livestock, poultry, companion animals. Emphasizes problem identification/solving. Lecture/lab.

Ent 5011. Insect Structure and Function. (4 cr; QP–3005 or # or SP–3005 or # or A-F only) Comparative study of insect structure/functions from evolutionary perspective. Introduction to physiology of digestion, respiration, other organ systems.

Ent 5021. Insect Taxonomy and Phylogeny. (4 cr; QP–Biol 1009 or SP–3001 or equiv; A-F only) Identification of families of adult insects; evolution and classification of insects; techniques of collecting and curating insects; principles of phylogeny reconstruction.

Ent 5031. Insect Physiology. (2 cr; QP–5010, biochem course or SP–5011, biochem course or #; A-F only) Essential processes of insects. Nerve and muscle mechanisms, energy metabolism, respiration, nutrition and digestion, excretion, regulation and interactions of processes, sensory mechanisms, and behavior. Reproductive behavior, embryology, and postembryonic development of insects.

Ent 5041. Insect Ecology. (3 cr; QP–Biol 5041 or EBB 5122 or #; offered fall 1998 and alt yrs; SP–Biol 5041 or EBB 5122 or #; offered fall 1998 and alt yrs) Synthetic analysis of the causes of insect diversity and of fluctuations in insect abundance. Focus on abiotic, biotic, and evolutionary mechanisms influencing insect populations and communities.

Ent 5211. Insect Pest Management. (3 cr; QP–3005 or #; SP–3005 or #) Prevention or suppression of injurious insects by integrating multiple control tactics, e.g., chemical, biological, cultural. Strategies to optimize the dynamic integration of control methodologies in context of their economic, environmental, and social consequences.

Ent 5275. Medical Entomology. (3 cr; QP–3005 or #; offered 1998 and alt yrs; SP–3005 or #; offered 1998 and alt yrs) Biology of arthropod vectors of human disease. Emphasis on disease transmission and host, vector, and pathogen interactions.

Ent 5311. Sampling Biological Populations. (3 cr; QP–Stat 5021 or equiv; SP–Stat 5021 or equiv) Sampling plans for study of field/lab populations. Statistical distributions/techniques for detecting/analyzing sample size, optimal allocation for common probability design. Sequential plans for making decisions.

Ent 5321. Ecology of Agricultural Systems. (3 cr; SP–Agro 5321, (3xxx or above) course in [Agro or AnSci or Hort,]; (3xxx or above) course in [Ent or PiPf or SoI] or #; SP–Agro 5321, (3xxx or above) course in [Agro or AnSci or Hort,] or (3xxx or above) course in [Ent or PiPf or SoI]) or #; A-F only) Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

Ent 5341. Biological Control of Insects and Weeds. (3-4 cr; QP–Bio–Biol 3001 or # or SP–3001, Biol 1009, EEB 3001 or grad; A-F only) Biological control of arthropod pests and weeds. Analysis of relevant ecological theory and case studies; biological control agents. Lab includes natural enemy identification, short experiments, and computer exercises.


Ent 5361. Aquatic Insects. (3 cr; QP–1005 or # or SP–3001 or # or A-F only) Taxonomy and natural history of aquatic insects including their importance in aquatic ecology, water resource management, recreation, and conservation. Emphasis on family-level identification of immature and adults. Field trips scheduled to local aquatic habitats. A collection is required.

Ent 5371. Principles of Systematics. (3 cr; QP–#; offered alt yrs; SP–#; offered alt yrs) Theoretical/practical approaches of biological systematics. Phylogeny reconstruction, including computer assisted analyses, morphological/molecular approaches, species concepts, speciation, comparative methods, classification, historical biogeography, nomenclature. Use/value of museums.

Ent 5381. Lepidopterology. (3 cr; QP–Ent course or #, one course each in ecology and genetics recommended; SP–Ent course or #, one course each in ecology and genetics recommended) Overview of Lepidoptera with emphasis on processes and phenomena such as polymorphism, mimicry, and individual quality that are well demonstrated by this insect order.

Ent 5481. Invertebrate Neurobiology. (3 cr; QP–§5480; SP–§5481) Fundamental principles/concepts underlying cellular bases of behavior/systems neuroscience. Particular invertebrate preparation.

Ent 5900. Basic Entomology. (1-6 cr; QP–SP–#) For graduate students who need to make up certain deficiencies in their biological science background. Individual invertebrate preparation.

Ent 5910. Special Problems in Entomology. (1-6 cr; max 10 cr) QP–# or SP–#) Individual field, lab, or library studies in various aspects of entomology.

Ent 5920. Special Lectures in Entomology. (1-3 cr) Lectures or labs in special fields of entomological research given by a visiting scholar or regular staff member.

**Environmental Science (ES)**

**College of Agricultural, Food, and Environmental Sciences**

**ES 1011. Issues in the Environment.** (3 cr) Insight and analysis of environmentally stressed situations. Modes of avoiding and redressing pollution in the context of cultural and social systems and customs. Review current environmental issues through various media presentations by faculty and invited speakers.

**ES 1051. Introduction to Environmental Science.** (3 cr; SP–§Biol 1051) Current environmental issues including air and water pollution, human population, toxic and hazardous wastes, urbanization, land use, biological diversity, energy, attitudes toward nature, environmental politics, and ethics.

**ES 4096. Professional Experience Program: Internship.** (1-3 cr; max 6 cr; QP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only; SP–COAFES undergrad, #, complete internship contract available in COAFES Career Services before registering; UC only) Both an oral and written report is done based on a paid or volunteered work position, or other field experience.

**Family Education (FE)**

**Department of Work, Community, and Family Education**

**College of Education and Human Development**

**FE 5001. Family Education Perspectives.** (3 cr; A-F only) Origins, evolution, and critique of alternative perspectives on family education. Implications for clients, programs, and educators.

**FE 5003. Contemporary Family Education.** (3 cr; A-F only) Transitions in family life examined, with emphasis on preparing educators and educational programs.

**FE 5200. Special Topics in Family Education.** (1-4 cr; max 4 cr) Study of a topic in family education that is either not covered in available courses or that is not covered in sufficient breadth and depth to meet student needs and interests. Topics vary.

**FE 5201. Family and Work Relationships.** (3 cr; A-F only) Examination of the interactions of work and family to prepare professionals for improving work and family relationships.

**FE 5202. Sexuality Education.** (3 cr; SP–Human sexual behavior course, family ed course; A-F only) Preparation to develop, deliver, and evaluate sexuality education. Strategies to help children and adults acquire information, form values, develop interpersonal skills, and exercise personal responsibility in the sexual dimensions of individual and family life.

**FE 5203. Family Communication Education.** (3 cr; A-F only) Knowledge and skills needed to develop, deliver, and evaluate educational programs about family communications. Examination of family communications principles and issues. Development of appropriate teaching methods and materials.
FE 5301. Program Planning in Family Education. (3 cr; A-F only)
Exploration of curriculum research and theory; examination and critique of alternative perspectives and their concomitant implications for families; development and evaluation of family education curriculum and programs.

FE 5302. Family Education Curriculum in Secondary Schools. (3 cr; A-F only)
Examination, development, and implementation of family and consumer science curriculum in secondary schools. Emphasis on curricular perspectives from social reconstruction and cognitive processes.

FE 5303. Instructional Strategies in Family Education. (3 cr; A-F only)
Theory and research relevant to methods of teaching; development of skill in using methods; emphasis on methods that support families taking technical, communicative, and emancipatory action.

FE 5701. Practice of Parent Education I. (3 cr; A-F only)
Examination of parent education in community settings; consideration of parents as adult learners with diverse backgrounds; development of group facilitation skills; observation and interviewing in community settings; reflection on and critique of the practice of parent education.

FE 5702. Practice of Parent Education II. (3 cr; SP–5701 or A-F only)
Development of curriculum for parent education; consideration of teaching groups and individuals; consideration of ethics in parent education; evaluation of parent education programs; development of curriculum and teaching portfolio; reflection on and critique of the practice of parent education.

FE 5703. Advanced Practice of Parent Education. (3 cr; SP–5702 or A-F only)
Evolution perspectives of parent education. Emphasis on psycho-dynamic, conceptual-change approaches. Reflective and dialogic approaches for working with parents in understanding beliefs and examining their origins and consequences. Examination of issues related to diversity, self-awareness, ethics, and evaluation.

FE 5706. Parent Education Practicum. (1-4 cr [max 4 cr]; OP–5320; SP–5702 or 5701 or A-F only)
Supervised parent education field assignments designed according to licensure requirements and individual student needs, interests, and prior competencies.

FE 5993. Directed Study in Family Education. (1-4 cr [max 9 cr]; SP–[Varies by topic], at least soph)
Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member.

FE 5996. Internship in Family Education. (1-6 cr [max 6 cr]; SP–[Varies by topic])
Planned work experience focusing on educational competencies in family education settings. Nature and extent of responsibilities are defined by the position student assumes.

Family Social Science (FSoS)

Department of Family Social Science
College of Human Ecology

FSoS 2101. Preparation for Working With Families. (2 cr; QP–FSoS major; A-F only)
Systematic preparation for upper division education, research/field internships, and career possibilities in Family Social Science.

FSoS 2191. Independent Study in Family Social Science. (1-4 cr [max 12 cr]; SP–Soph, #)
Independent reading or writing or research under faculty supervision.

FSoS 3101. Personal and Family Finances. (3 cr; SP–Soph or #)
Analysis of personal and family financial management principles. Financial planning of savings, investments, credit, mortgages, and taxation; life, disability, health, and property insurance; public/private pensions. Estate planning.

FSoS 3102. Family Systems and Diversity. (3 cr; SP–Soph or #)
Family systems/theories applied to dynamics/processes relevant to family life. Diversity issues related to gender, ethnicity, sexual orientation, and disability. Divorce, single parenthood, remarriage. Family strengths/problems.

FSoS 3103. Family Resource Management. (3 cr; SP–Soph or #)
Analysis of how individuals/families use interpersonal, economic, natural, and community resources to make decisions, solve problems, and achieve central life purposes.

FSoS 3105. Special Topics in Family Social Science. (2-4 cr [max 4 cr]; SP–[Varies by topic, at least soph])
Review of research/scholarly thought. Topics specified in Class Schedule.

FSoS 3191. Independent Study in Family Social Science. (1-5 cr [max 12 cr]; SP–[Varies by topic, at least soph])
Independent reading or writing or research under faculty supervision.

FSoS 3426. Alcohol and Drugs: Familiarities and Culture. (3 cr; SP–54526)

FSoS 3427. Alcohol, Drugs, and the Brain. (1 cr; SP–54527)

FSoS 3428. Assessment and Treatment of Alcohol and Drug Use Issues. (3 cr; SP–54528)

FSoS 3429. Counseling Skills Practicum I. (3 cr; SP–54529)
Basic counseling skills. Counselor needs/motivations, non-verbal communication, basic/advanced empathy, identifying strengths, maintaining focus, challenging discrepancies, use of self. Emphasizes building from client strengths, learning through role-playing. Note: Course not offered after spring semester 2001.

FSoS 3431. Counseling Skills Practicum II. (3 cr; QP–[3029, 3030] or SP–[54531; 3429, 5429])

FSoS 3432. Chemical Abuse and Families: an Overview. (3 cr; SP–54532)
Relationships, family systems, families in which alcohol or drug use is a problem. Family types, family of origin, models of family therapy, family systems theory, alcoholism. Review of literature. Note: Course not offered after spring semester 2001.

FSoS 3433. Group Therapy: Theory and Practice. (3 cr; SP–54533)
Introduction to group therapy concepts. Stages of group development, affective development, group communication. Education, support, therapy groups. Leadership roles/functions, critical incidents, therapeutic factors, group processes. Lecture, small groups. Note: Course not offered after spring semester 2001.

FSoS 3434. Gambling in America. (3 cr; SP–54534)

FSoS 3435. Internship in Alcohol and Other Drug Use Problems. (2-18 cr [max 18 cr]; QP–ADCEP certificate program, #SP–55435; ADCEP certificate program, #5-N only)
Students are placed in three-four different community agencies/treatment centers. (A separate registration is required for each placement.) An 880-hour rotating clinical internship. Note: Course not offered after spring semester 2001.

FSoS 3436. Ethical Issues in Addiction Counseling. (1 cr; QP–ADCEP certificate program, #SP–54366; ADCEP certificate program, #5-N only)
Ethical issues/challenges in alcohol/drug counseling/therapy. Decision-making, values conflicts, boundary violations, client rights, professional responsibilities. Issues in relationship/family therapy, group work, cross-cultural counseling, working with special populations. Note: Course not offered after spring semester 2001.

FSoS 3437. Supervision Group. (2 cr [max 6 cr]; QP–ADCEP certificate program, #SP–54347; ADCEP certificate program, #5-N only)
Supervised alcohol/drug use counseling in group format. Each student presents at least one tape of a client counseling session. Role-playing, extensive discussion of clinical issues. Focus on non-pathologizing models of therapy. Training tapes, readings. Note: Course not offered after spring semester 2001.

FSoS 3450. Special Topics: Addiction. (1-4 cr [max 9 cr])
Selected reading or project in alcohol/drug use problems. Note: Course not offered after spring semester 2001.

FSoS 4101. Sexuality and Gender in Families and Close Relationships. (3 cr; QP–[90 or cr (grad student in social or behavioral or educational or health science or human service program) or SP–[3102, 3103] or SP–[90 cr or grad student in social or behavioral or educational or health science or human service program] or SP–[3102, 3103] or #)
Human ecology/development as frameworks for examining sexuality in close relationships. Diversity of sexual beliefs, attitudes, behaviors within differing social contexts. Using scientific knowledge to promote sexual health among individuals, couples, families through various life stages.

FSoS 4102. Global and Diverse Families. (3 cr; QP–3600; SP–[3102, 3103] or #)
Perspectives on family dynamics of various racial/ethnic populations in the United States/other countries in context of national/international economic, political, and social processes.

FSoS 4103. Family Policy. (3 cr; QP–SW 3101 or Pol 1001 or #SP–3102, 3103 or #)
Connections between the policies that governments enact, and families and their well-being. Conceptual frameworks to identify and understand some of the influences underlying policy choices and for evaluating the consequences of such choices for diverse families.

FSoS 4104W. Family Psychology. (3 cr; QP–3600; SP–[3102, 3103] or #)
Processes in families of origin, families of choice, and other close relationships, within diverse social contexts. Evaluating current research on family dynamics within/across generations.
Course Descriptions

FSoS 4105. Methods in Family Research. (3 cr; QP–[3260; SP–[3102, 3103], one introductory course in social science) Scientific method. Major questions/objectives of family research. Data collection/analysis/reporting. Social context of family research.

FSoS 4130. Special Topics in Family Social Science. (2-4 cr; max 12 cr; SP–[Varies by topic at least 2]) Review of research/scholarly thought. Topics specified in Class Schedule.


FSoS 4153. Family Financial Counseling. (3 cr; SP–3101 or #; A-F only) Introduction to family financial management applications through a case study approach of the different stages in the family financial life cycle.

FSoS 4154W. Families and Aging. (3 cr; QP–[3260 or 3600, SW 3202 or intro pol sci course or #; SP–3102, 3103 or #) Aging families from diverse socioeconomic and cultural groups are examined as complex multidimensional systems interacting within ever-changing social structures.

FSoS 4155. Parent-Child Relationships. (3 cr; QP–[5200 or 5202, Psy 1301; SP–3102, 3103 or #; A-F only) History, theories, research and contemporary practices of parent-child relationships in diverse families and cultures across the life span. Preparation for professionals in education, social work, and other human service occupations.

FSoS 4156. Legal-Economic Controversies in Families. (3 cr; QP–[3260 or 3600 or 5200 or SP–3101 or 3103 or #) Interdisciplinary course for critical thinking about legal-economic controversies across the family life span. Principles of argumentation and debate are used to analyze controversies with the intention to prepare citizens for public decision making roles and political discourse about controversial family issues.

FSoS 4191L. Independent Study in Family Social Science. (1-4 cr; max 12 cr; SP–#) Independent reading or writing or research under faculty supervision.

FSoS 4294. Research Internship. (1-4 cr; max 4 cr; SP–FSoS major, #) Research project with faculty. May include planning, proposal writing, literature review, data collection/coding/cleaning/analysis, and reporting.

FSoS 4296. Field Study: Working With Families. (1-4 cr; max 12 cr; SP–[Q3, 951; #; SP–Acct 2050, SMO 1550; A-F only) Directed paraprofessional work experience related to student’s area of study.

FSoS 5101L. Family Systems. (3 cr; QP–Intro course in psych, soci; SP–[3102, 3103, grad student) Family systems and other family theories focusing on the dynamics and processes relevant to family life. Diversity issues related to gender, ethnicity, sexual orientation, and disability. Issues related to divorce, single parenthood, and remarriage are covered. Family strengths and family problems are integrated.


FSoS 5432. Chemical Abuse and Families: An Overview. (3 cr; SP–[3432) Relationships, family systems with particular application to families in which alcohol or drug use is a problem. Family types, family of origin, models of family therapy, family systems theory, alcoholism. Review of literature. Note: Course not offered after spring semester 2001.


FSoS 5435. Ethical Issues in Addiction Counseling. (1 cr; QP–ADCEP certificate program, SP–[3435, ADCEP certificate program, #; S-N only) Students are placed in three-four different community agencies/treatment centers. (A separate registration is required for each placement.) An 880-hour rotating clinical internship. Note: Course not offered after spring semester 2001.


FSoS 5437. Supervision Group. (2 cr; # cr) QP–ADCEP certificate program, #; SP–[3437, ADCEP certificate program, #; S-N only) Supervision of alcohol/drug use counseling in group format. Each student presents at least one tape of a client counseling session. Role-playing, extensive discussion of clinical issues. Focus on non-pathologizing models of therapy. Training tapes, readings. Note: Course not offered after spring semester 2001.


Finance (Fina)

Department of Finance

Curtis L. Carlson School of Management

Fina 3000. Fundamentals of Financial Management. (2.67 cr; SP–[Acct 1050 or Acct 2050, at least 30 cr completed or in progress) A-F only) Introduction to financial management principles. Money/capital markets, risk/return/volatility triad, capital budgeting, capital structure/financial leverage, cost of capital, financial performance measures, dividend policy, working-capital management, international financial management/derivatives.


Fina 4121. Financial Markets and Interest Rates. (2 cr; QP–SP–3100; SP–4241; A-F only) Basic framework for valuing fixed income securities. Term structure on interest rates, forward rates, principles of fixed-income valuation. Surveys treasury, corporate, municipal, securitization markets.


Fina 4241. Corporate Financing Decisions. (4 cr; QP–3000; SP–3001; A-F only) Theoretical/applied understanding of corporate financial decisions. Marketing, market decisions, tax effects, managerial incentives, investment banking, effect of financing issues on investment decisions, basic options.

Fina 4242. Corporate Investment Decisions. (4 cr; QP–3000, 3100; SP–4241; A-F only) Focuses on efficiently managing working capital and fixed assets. Cases illustrate some of the topics: working capital management, making capital budgeting decisions, targeting/evaluating firm performance, assessing mergers/acquisitions.

Fina 4321. Portfolio Management and Performance Evaluation. (2 cr; QP–SP–3000; SP–4241, 4321; A-F only) Introduces investment evaluation concepts used to manage security portfolios. Portfolio/security risk/return tradeoffs, portfolio diversification, asset allocation, tax effects, managerial incentives, investment banking, effect of financing issues on investment decisions, basic options.


Fina 4541. Futures, Options, and Other Derivative Securities. (4 cr; QP–Fina 3200, Fina 3300; SP–4241, 4321, 4421; A-F only) Foundations of stochastic cash flow representations, construction portfolios of futures/options basic methods for valuing real/final financial futures, swaps, options.
Fisheries and Wildlife (FW)

Department of Fisheries and Wildlife

College of Natural Resources

FW 1001. Orientation in Fisheries, Wildlife, and Conservation Biology. (1 cr; A-F only)
Survey of technical requirements and education needed for careers in fisheries, wildlife, and conservation biology. Introduction to fields of work, problems, and career opportunities.

FW 1002. Wildlife: Ecology, Values, and Human Impact. (3 cr)
Controversial issues involving specific wildlife management principles and techniques. For students without natural science background interested in natural resource topics, especially wildlife management issues.

FW 2001. Introduction to Fisheries, Wildlife, and Conservation Biology. (3 cr; QP–Biol 1201 or Biol 1009; SP–Biol 1001 or Biol 1009)
Theory and practice of fisheries and wildlife management including single species ecosystems, and landscape approaches. The biota, habitat, and sociopolitical aspects of human use. Case studies explore current issues in conservation.

FW 3003. Wildlife in Agricultural Land. (2 cr)

FW 4001. Biometry. (4 cr; QP–Math 1031; SP–Math 1031; A-F only)
Basic statistical concepts such as probability, sampling space, and frequency distributions. Descriptive statistics: sample tests, linear regression (simple and multiple), ANOVA, goodness of fit, nonparametric method and other relevant selected topics (e.g., clustering and classification).

FW 4106. Important Plants in Fisheries and Wildlife Habitats. (1 cr; QP–FW 5600; SP–4108; A-F only)
Field identification of important plants in fisheries and wildlife habitats.

FW 4108. Field Methods in Research and Conservation of Vertebrate Populations. (3 cr; QP–Biol 3008; SP–Biol 3407; A-F only)
Planning and implementation of research and management projects; collect and analyze data in groups; group and individual oral and written reports; each student keeps a field journal.

FW 4129. Mammalogy. (4 cr; QP–Biol 1106 or 3011 or #; SP–Biol 2012; A-F only)
Evolutionary and biogeographic history of mammals. Recognize, identify, and study natural history of mammals at the ordinal level, North American mammals at familial level, and mammals north of Mexico at generic level. Minnesota mammals at specific level.

FW 4136. Ichthyology. (4 cr; QP–Biol 1106 or 3011; SP–Biol 2012)
Fish biology, adaptations to different environments and modes of living, and evolutionary relationships. Laboratory exercises anatomy and identification of Minnesota fishes.

FW 4200H. Honors Seminar. (1 cr; QP–FW upper div honors, #; SP–FW upper div honors, #; A-F only)
Current topics presented by faculty/students. Lecture/discussion.

FW 4291. Independent Study: Fishes. (1-5 cr; QP–A-F only)
Individual field, library, and lab research in fisheries.

FW 4292. Special Lectures: Fisheries. (1-5 cr; QP–SP–#)
Lectures in special fields of fisheries given by a visiting scholar or regular staff member.

FW 4391. Independent Study: Wildlife. (1-5 cr; QP–A-F only)
Individual field, library, and lab research in wildlife.

FW 4392. Special Lectures: Wildlife. (1-5 cr; QP–A-F only)
Lectures on special topics of wildlife given by a visiting scholar or a staff member.

FW 4401W. Introduction to Fish Physiology and Behavior. (4 cr; QP–Biol 1001 or Biol 1009)
The physiology of fishes and their behavior, with an emphasis on how life in aquatic environment has influenced fish biology. Includes examination of ionic and osmotic balance, sensory systems, gas exchange, endocrinology, growth, foraging, locomotion, reproduction, orientation and migration, and toxicology.

FW 4565. Fisheries and Wildlife Ecology and Management: Field Trip. (1 cr; QP–Biol 1001 or Biol 1009)
Ten-day field trip to Wyoming and points en route during spring break emphasizing a broad range of fisheries and wildlife management including big game, waterfowl, and endangered species.

FW 4701. Fisheries and Wildlife Problem Solving. (2 cr; max 2 cr; QP–FW or grad student or #; SP–FW or grad student or #)
Management problem identification/analysis, information gathering/analysis, oral/written reporting. Selected management issues.

FW 4801H. Honors Research. (2 cr; QP–FW upper div honors, #; SP–FW upper div honors, #; A-F only)
Independent research project supervised by faculty member.

FW 4802H. Honors Research. (2 cr; QP–FW upper div honors, #; SP–FW upper div honors, #; A-F only)

FW 5003. Human Dimensions of Biological Conservation. (3 cr; QP–Biol 1201 or Biol 1009;SP–Biol 1001 or Biol 1009; Biol 3008; SP–Biol 1001 or Biol 1009; Biol 3407)
Survey of social, psychological, economic, and policy aspects of managing/conserving wildlife, fisheries, and related resources.

FW 5051. Analysis of Populations. (3-4 cr; QP–Biol 1009 or Biol 1201, Stat 3011 or Stat 5021 or #; SP–Biol 1001 or Biol 1009, Biol 4001 or Stat 3011 or Stat 5021 or #)
Factors involved in the regulation, growth, and general dynamics of populations. Data needed to describe populations, population growth, population models, and regulatory mechanisms.

FW 5111. Aquatic Toxicology. (3 cr; QP–Biol 3008 or EEB 5601; SP–Biol 3407 or EEB 4601)
Pollution assessment approaches, biological effects, fate and flow of contaminants in aquatic systems, and major types of pollutants.

FW 5455. Sustainable Aquaculture. (3 cr; QP–Biol 1106; Chem 1051, Math 1031 or #; SP–Biol 2012; Chem 1021, Math 1031 or #; A-F only)
Role of aquaculture in fisheries management, biodiversity rehabilitation, and food production around the world. Implications for the sustainability of human-environment interactions in different societies. Principles of fish husbandry.

FW 5571. Avian Conservation and Management. (3 cr; QP–EEB 5134 or grad or #; SP–EEB 4134 or grad or #)
Current problems in avian conservation and management with equal emphasis on nongame, wetland, and game birds.

FW 5601. Fisheries Population Analysis. (3 cr; QP–Biol 3008, Math 1251; Stat 3012 or Stat 5021; SP–Biol 4001; Stat 5021; Biol 3407, [Math 1192 or Math 1271]; A-F only)
Introduction to theory/methods for estimating vital statistics of fish populations. Using microcomputers/statistical software to describe, analyze, and model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management.

FW 563W. Habits and Regulation of Wildlife. (3 cr; QP–Biol 3008; SP–Biol 3407; A-F only)
Environmental interactions of wildlife at both population and community levels; environmental threats from human activities; habitat management practices; objectives, polices, and regulations in population management.
Course Descriptions


FW 5621. Geographic Information Systems for Fisheries, Wildlife and Biological Conservation. (3 cr) Hands-on experience with GIS as a tool for understanding, analyzing, and managing ecological systems. ARC-INFO and how to apply it to problems in fisheries, wildlife, and biological conservation.

FW 5625. Wildlife Handling and Immobilization for Research and Management. (cr; QP–General biology, grad student or vet med student or FW Sr.; SP–General biology, grad student or vet med student or FW Sr.; A, S-only) Practical techniques to maximize human/animal safety and encourage effective operations. Preparation procedures, legal responsibilities, capture drugs/delivery systems, safety measures, ethical issues, basic veterinary procedures for handling wildlife. Field course. Uses live animals.

Food Science and Nutrition (FScN)

Department of Food Science and Nutrition

College of Agricultural, Food, and Environmental Sciences and College of Human Ecology

FScN 1011. The Science of Food. (4 cr) Physical and chemical changes occurring during common food preparation techniques are evaluated. Experiments conducted to measure changes in specific food quality attributes.

FScN 102L. Introductory Microbiology. (4 cr) Broad introduction to the diverse world of microbes and how they impact our world in both deadly and life-saving ways.

FScN 1102. Food: Safety, Risks, and Technology. (3 cr) Ethical use of public policy and food technology to reduce or control risks in our food supply. Survey of microbiological, chemical, and environmental risks, and government and industry controls used to ensure food safety.


FScN 1511. Food Animal Products for Consumers. (3 cr; SP–San 5111) The compositional variation, processing, selection, storage, cookery, palatability, nutritional value, and safety of red meat, poultry, fish, and dairy products.

FScN 3102. Introduction to Food Science. (3 cr; QP–Chem 1002 or Chem 1052; SP–Chem 1022) Introduction to composition of and chemical/physical properties of foods. Evaluating interaction/reaction of foods due to formulation, processing, and preparation.

FScN 3162. Life Cycle Nutrition. (3 cr; QP–Chem 1052, 1612; SP–Chem 1002, 1112) Nutritional changes throughout lifecycle. Pregnancy, lactation, childhood, adulthood, aging. Topics relevant to lifecycle changes (e.g., body composition, immunity, sports nutrition).

FScN 3614. Nutrition Education. (2 cr; QP–1612; SP–1112) Application of theories/principles of learning, behavior change, instructional methods to nutrition education in community settings.

FScN 3615. Sociocultural Aspects of Food, Nutrition, and Health. (3 cr; QP–1612; SP–1112) Sociocultural aspects of regional and cultural diversity in food preferences and food behavior, food habits, demographics, lifestyles, food consumption, and expenditures. Effect of socioeconomic status, religious beliefs, age, and cultural meaning of food on food choices.

FScN 3662. Introduction to Dietetic Practice. (2 cr; QP–1612; admitted to Coordinated Program in Dietetics, SP–1112; admitted to Coordinated Program in Dietetics, A-F only) Introduction to the practice of dietetics in medical centers, residential care centers, ambulatory care clinics, and community service agencies.

FScN 3731. Food Service Operations Management Laboratory. (2 cr; QP–3102, 3732; SP–3102 or 53102 or 3732 or 5372; A-F only) Experience in managing a food service operation. On-/off-campus commercial/institutional restaurants used as labs. Required field trips.

FScN 3732. Food Service Operations Management. (3 cr; QP–3102; SP–[3102 or 53102],[3732 or 5372]; A-F only) Planning, preparing, delivering, serving, managing foods served away from home.

FScN 3796. Field Experience in Food Service Management. (3 cr; QP–3732, admitted to Coordinated Dietetics Program, SP–3732) Supervised food service production/management experience in a community or health care facility.

FScN 4096. Professional Experience Program: Internship. (1-3 cr [max 3 cr]; QP–FScN undergrads, #; UC only; SP–FScN undergrads, #; UC only; A-F only) Supervised practical and professional experience in food industry firms or government agencies; evaluative reports and consultations with faculty advisors and employees. Registration information in COAFES Career Services.

FScN 4103. World Foods Problems. (3 cr; QP–$Agro 5200, $Agro 5790, $CAPS 5280, or Jr or Sr grad; $Agro 4103, $Agro 4105, $CAPS 4130; Jr or Sr grad) A multidisciplinary look at problems and possible solutions in food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views of population, use of technology, and ethical and cultural values of people in various parts of the world.

FScN 4111. Food Chemistry. (3 cr; QP–3102, BioC 3021, SP–3102, BioC 3021) Study of chemical structures and functional properties of food components in relation to their roles as parts of complex biochemical systems and as modified by environmental and processing factors.

FScN 4121. Food Microbiology and Fermentations. (3 cr; QP–1102, VPB 3103 or MibC 5105; SP–1102, VPB 2032 or MibC 3301 or MibC 2032) Relationship of environment to occurrence, growth, and survival of microorganisms in foods, control of foodborne pathogens and spoilage organisms in foods, and use of microorganisms in food fermentations.

FScN 4212. Laboratory Methods in Food Microbiology and Fermentations. (2 cr; QP–VPB 3103 or MibC 5105; SP–4121; A-F only) Microbiological methods for analysis of foods. Use of microorganisms for production of foods.

FScN 4331. Food Quality. (3 cr; QP–[1102, 1202] or [1111, 4121]) Management systems in the processing and distribution of foods that insure food quality and compliance with food laws and regulations. Quality management, HACCP audits, plant/equipment design for sanitation, specifications, recalls, and control systems.

FScN 4391. Independent Study. (1-4 cr [max 4 cr]; QP–Undergrads, #; SP–Undergrads, #) Individual lab or library research in an area related to food science or nutrition.

FScN 4312W. Food Analysis. (4 cr; QP–5110, Stat 3012; SP–4111, Stat 3011) Examination of components in foods with analytical measurement as the primary focus. Chemical, physical, and sensory techniques are used to identify and characterize major and minor components in food systems.

FScN 4331. Food Process Engineering I (3 cr; QP–3136, Math 1252, Phys 1042; SP–3102, Math 1272, [Phys 1102 or [Phys 2202], A-F only) Specific applications of engineering principles (e.g., heat/mass transfer, kinetics, thermodynamics) to unit operations in food production.

FScN 4332. Food Process Engineering II. (4 cr; QP–5135; SP–4331; A-F only) Application/integration of engineering principles to unit operations used in food production. Equipment design. Effects of processing on food quality (chemical, microbiological).


FScN 4342. Properties of Water in Foods. (4 cr; QP–5135; SP–4331) Principles involved in processing, handling, and storage of frozen, dry and intermediate moisture biological materials (foods, drugs, biologics) with emphasis on the physio-chemical properties of water in food.

FScN 4343. Processing of Dairy Products. (3 cr; QP–5110, 5120, 5135; SP–4131, 4121, 4331) Demonstration and application of the basic concepts of food engineering and processing to the production of fluid, concentrated, and dehydrated dairy products.

FScN 4344. Technology of Fermented Dairy Products. (4 cr; QP–5110, 5120, 5135; SP–4111, 4211, 4331) Integration of chemical, microbiological, and physical principles involved in the manufacture and storage of cheeses and fermented milks.

FScN 4345. Flavor Technology. (3 cr; QP–5110, 5120, 5136; SP–4111, 4331, 4412) Flavor/olfavor development in foods. Industrial production of food flavorings, their proper application to food systems.

FScN 4346. Functional Foods: Regulations and Technology. (3 cr; QP–[5110, 5120] or [5130, 5135] or [5120, 5135]; SP–[4111, 4211] or [4111, 4311] or [4121, 4312] A-F only) Overview of application of regulatory principles, food science, nutritional science to development of nutraceuticals, functional foods, dietary supplements. Scientific basis, technologies, legal requirements, animal/clinical evaluation, consumer usage versus need. Review of products available in world market, with focus on the United States.

FScN 4451. Food Marketing Economics. (3 cr; QP–ApEc 3101, SP–ApEc 4451, ApEc 3001 or Econ 3103) Food consumption trends; consumer food behavior; marketing strategies; consumer survey methodology; food distribution and retailing system; food policy issues related to food marketing. Individual and group projects.

FScN 4596. Field Experience: Community Nutrition. (3 cr; QP–Admitted to first year Coordinated Program in Dietetics, #; SP–Admitted to first year Coordinated Program in Dietetics, A-F only) Application of nutrition knowledge in the solution of problems related to health promotion. Assigned readings, discussion, and experiences in community agencies.
Course Descriptions

Forest Resources (FR)

Department of Forest Resources
College of Natural Resources

FR 1001. Orientation and Information Systems. (1 cr; A-F only)
Curricula offerings. Liberal education requirements. Careers in forest resources, urban forestry, and recreation resource management. Summer jobs/internships. Computers/computer-based tools as they apply to forestry/related coursework. Techniques for information retrieval.

FR 1101. Dendrology. (3 cr)
Identification nomenclature, classification, and distribution of important forest/shrub/tree species. Use of keys, field, and lab methods of identification.

FR 2101. Forest Plants. (1 cr; QP–Biol 1201 or Biol 1009; SP–Biol 1001 or Biol 1009; A-F only)
Field identification of trees, shrubs, and nonwoody vascular plants. Emphasizes concept of plant communities, soil site relationships, and wildlife values. Taught at Itasca State Park.

FR 2102. Forest Ecology: Field Experience. (2 cr; QP–Biol 1201 or Biol 1009, Chem 1001 or Chem 1051; SP–Biol 1001 or Biol 1009, Chem 1011 or Chem 1021; A-F only)
Taught in Itasca State Park. Field examination of forests in terms of soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology.

FR 2104. Forest Measurement/Techniques. (1 cr; QP–High school or college trigonometry) or (QP–High school or college trigonometry) or (A-F only)
Introduction to land survey, tree/stand measurement, and basic forest sampling techniques. Taught at Itasca State Park.

FR 3104. Forest Ecology. (4 cr; QP–Two biology courses, chem course; SP–§ 3104, two biology courses, chem course; A-F only)

FR 3251. Role of Renewable Natural Resources in Developing Countries. (1 cr; SP–§ 2511; A-F only)
International perspectives on important resource issues including integration of natural resource, social, and economic considerations. Overviews of issues and case studies.

FR 3293. Directed Study Experience. (1-5 cr; QP–#; SP–#)
Student conducts a study/project on a topic of personal interest in consultation with faculty member. The course is documented by an initial proposal and reports of accomplishments.

FR 3501. Arboriculture. (3 cr; QP–1100 or Hort 1021, Biol 1103; SP–1101 or Hort 1021, Biol 2021)
Selection and culture of trees for urban spaces. Emphasis on tree selection, site preparation, plant health care management, and diagnosing urban tree problems. Designed for plant science or urban forestry majors as an introduction to tree care and management.

FR 3601. Elements of Surveying. (1 cr; QP–High school or college trigonometry; SP–High school or college trigonometry; A-F only)
Basic concepts of elementary plane surveying for use in natural resource assessment. Includes measurements of distance, elevation, angle and direction using transits, levels, total stations, and GPS equipment. Elements of coordinate systems, datum planes, and maps.

FR 4114. Forest Hydrology and Watershed Management. (3 cr; QP–Biol 1009, Chem 1052, Math 1142, Phys 1001 or #; SP–Biol 1009, Chem 1001, Phys 1001 or #)
Introduction to the hydrologic cycle and hydrologic processes. Effects of forest management and other types of land use on water yield, stormflow, erosion-sedimentation, and water quality. Concepts, principles, and applications of watershed management.
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<tr>
<th>Course Descriptions</th>
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<tr>
<td><strong>FR 4118. Tree Biology.</strong> (2 cr; QP–Chem 1002 or Chem 1052, or biology; SP–Chem 1011 or Chem 1021, Biol 2071; A-F only) The structure and physiological functioning of trees. Relations of tree biology to ecology and management.</td>
</tr>
<tr>
<td><strong>FR 4131. Geological Information Systems for Natural Resource Analysis.</strong> (3 cr; QP–Jr; SP–Jr; A-F only) An introduction to GIS focusing on natural resources. Topics include data structures, sources, collection, and quality; geodesy and map projections; spatial analyses; cartographic modeling. Laboratory exercises complement theory covered in lecture.</td>
</tr>
<tr>
<td><strong>FR 4200H. Honors Seminar.</strong> (1 cr; QP–FR upper div honors; SP–FR upper div honors; A-F only) Current topics presented by faculty/students. Lectures. Discussions.</td>
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<tr>
<td><strong>FR 4218. Assessment and Modeling of Forests.</strong> (3 cr; QP–Math 1142 or Math 1251-1252, NRES 5210, Stat 3011 or Stat 5121; SP–Math 1142 or Math 1271-1272, Stat 3011; A-F only) Sample survey techniques; measurement and sampling methods for forest vegetation; tree and stand growth modeling; landscape processes, characterization, and modeling.</td>
</tr>
<tr>
<td><strong>FR 4232W. Management of Recreational Lands.</strong> (4 cr; A-F only) Understanding and applying recreation management tools from a public agency perspective. Management concepts such as social carrying capacity, ROS, LAC, BBM, and VERP are examined and used for various projects.</td>
</tr>
<tr>
<td><strong>FR 4262. Remote Sensing of Natural Resources.</strong> (3 cr; QP–Phys 1001 or Phys 1041; SP–Phys 1001 or Phys 1101) Principles and techniques of remote sensing. Applications to natural resource inventory and mapping, land use analysis, and monitoring environmental and natural resources. Photographic and digital sensing approaches considered. Lab gives hands-on experience with aerial photography and digital imagery.</td>
</tr>
<tr>
<td><strong>FR 4411. Silviculture Systems.</strong> (3 cr; QP–3104; SP–3104) Introduction to silvics, reforestation and restoration techniques, intermediate stand treatments, and silvicultural systems.</td>
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<tr>
<td><strong>FR 4431. Timber Harvesting and Road Planning.</strong> (1 cr; QP–5100; SP–4411 or #) Timber harvesting and road planning terminology, basic concepts of harvesting systems, equipment, costs, best management practices, road planning concepts, and the relationship to forest management. Fundamentals of preparation and administration of timber sales.</td>
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<tr>
<td><strong>FR 4461. Water Quality: The International Dimension.</strong> (3 cr; QP–Water resource course; SP–Water resource course) Active learning approaches are used to understand how culture defines water quality management and how and why management varies among countries. Become familiar with multinational river basin compacts and policies for international management.</td>
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<tr>
<td><strong>FR 4471. Forest Management and Planning.</strong> (3 cr; QP–5218, AP&amp;ES 1101 or Econ 1101, NRES 5260 or #; QP–4218, AP&amp;E 1101 or Econ 1101, NRES 5261 or #; A-F only) Forest management decisions at the stand and forest-wide level; forest regulation principles and techniques; forest management scheduling models including linear programming and simulation; economic trade-off and impact analysis in forest planning.</td>
</tr>
<tr>
<td><strong>FR 4480. Topics in Natural Resources.</strong> (1-3 cr [max 12 cr]; QP–#; SP–#) Lectures in special fields of forest resources given by a visiting scholar or regular staff member. Topics specified in Class Schedule.</td>
</tr>
<tr>
<td><strong>FR 4501. Urban Forest Management.</strong> (3 cr; QP–5500; SP–3501) Basic and advanced management concepts for the green infrastructure of cities, towns, and communities. The urban forest is studied as a social as well as a biological resource. Emphasis on management of urban forest ecosystem to maximize benefits to people.</td>
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<tr>
<td><strong>FR 4611. Field Silviculture.</strong> (3 cr; QP–5100; SP–4411) Industrial/state silviculture practices, applied silvicultural research. Developing silvicultural prescriptions for artificial/natural regeneration, intermediate stand treatments, silvicultural options for alternative forest products in conifer/deciduous stands. Silvicultural practices as implemented on industrial/publicly-owned lands. Field intensive.</td>
</tr>
<tr>
<td><strong>FR 4615. Remote Sensing and Resource Assessment: Field Applications.</strong> (2 cr; QP–5218, 5262; SP–4218, 4262; A-F only) Field applications of remote sensing, sampling and measurement methods to inventory, mapping and monitoring forest and other natural resources. Offered at Cloquet Forestry Center.</td>
</tr>
<tr>
<td><strong>FR 4621. Timber Harvesting and Road Planning: Field Applications.</strong> (2 cr; QP–#; SP–#) Field application of best management practices, preparation/administration of timber sales, forest road design. On-site management of harvesting and silvicultural systems. Offered at Cloquet Forestry Center.</td>
</tr>
<tr>
<td><strong>FR 4801H. Honors Research.</strong> (2 cr; QP–FR upper div honors; SP–FR upper div honors; A-F only) First semester of independent research project supervised by faculty member.</td>
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<td><strong>FR 4894. Directed Research.</strong> (1-3 cr; max 10 cr; QP–#; SP–#) Research project on topic of personal interest under guidance of faculty mentor. Initial proposal. Reports.</td>
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<tr>
<td><strong>FR 5104. Forest Ecology.</strong> (4 cr; QP–Biological course; chem course; grad student; or SP–3304; [biological course; chem course; grad student] or #; A-F only) Form/function of forests as ecological systems. Characteristics/dynamics of species, populations, communities, landscapes, ecosystem processes. Examples apply ecology to forest management. Emphasizes fire ecology. Weekend field trip (required). Weekly recitations.</td>
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<tr>
<td><strong>FR 5142. Tropical Forest Ecology.</strong> (3-4 cr; QP–3xxx or above ecology course; SP–3xxx or above ecology course) Ecological principles related to forest, function, and development of wet and dry tropical forests at organismal, community, and ecosystem scales. Succession, productivity, biodiversity, sustainability, agroforestry, and management alternatives. Natural distribution of forest types; causes, consequences, and extent of deforestation.</td>
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<tr>
<td><strong>FR 5146. Dynamics of Global Change.</strong> (3-4 cr; QP–3xxx or above ecology course; SP–3xxx or above ecology course) Implications of global change upon wild and cultivated vegetation including forests, grasslands, and agricultural ecosystems. Responses at ecosystem, community, organismal, and physiological scales. Potential climate change; elevated atmospheric concentrations of carbon dioxide, ozone, and other trace gasses; acid deposition; and other pollutants.</td>
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<tr>
<td><strong>FR 5153. Forest and Wetland Hydrology.</strong> (3 cr; QP–5114 or #; SP–Basic hydrology course or #) Forested watersheds and hydrologic importance of forest vegetation in snow and rainfall regimes. Hydrologic role of forest vegetation on climate change. Includes analyses of temperature and moisture movement in uplands and wetlands and on the amount and timing of water flow.</td>
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<tr>
<td><strong>FR 5161. Forest Biology and Measurements: Field Experience.</strong> (2 cr; QP–#; SP–#; A-F only) Forest plant identification, forest community descriptions/dynamics, mapping forests, tree/stand inventory. Taught at Itasca State Park.</td>
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<tr>
<td><strong>FR 5228. Advanced Topics in Assessment and Modeling of Forests.</strong> (3 cr; QP–5218 or equiv; NRES 5210 or equiv; Stat 3011 or equiv; SP–4218, Math 1172, Stat 5021; A-F only) Recently developed mathematics, computer science, and statistics methodologies applied to forest resource functioning, management, and use problems.</td>
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<tr>
<td><strong>FR 5251. Role of Renewable Natural Resources in Developing Countries.</strong> (3 cr; SP–#; A-F only) An introduction to the role of renewable natural resources in developing countries. Topics include groundwater, water pollution, soil erosion, and minerals.</td>
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<tr>
<td><strong>FR 5264. Advanced Forest Management Planning.</strong> (2 cr; QP–#; SP–4411 or #) Strengths and weaknesses of modeling tools used in forest planning. Emphasis on problem sets and applications ranging from stand-level management to regional timber supply analyses and landscape-level planning. Review of recent literature and practical problems with implementation.</td>
</tr>
<tr>
<td><strong>FR 5403. Fundamentals of Natural Resource Education.</strong> (1-2 cr) For elementary teachers and others with instructor permission. Focus on understanding the forest community, the tools used by foresters, and awareness of effective forest management practices. Forestry-related indoor and outdoor activities which can be translated for classroom use.</td>
</tr>
<tr>
<td><strong>FR 5412. Advanced Remote Sensing.</strong> (3 cr; QP–#; SP–#) Provides fundamental and working knowledge of biophysical-geospatial remote sensing and its applications to monitoring environmental and natural resources. Includes experience working with digital remote sensing data, models, and image processing.</td>
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<tr>
<td><strong>FR 5700. Colloquium in Natural Resources.</strong> (1-3 cr; SP–Varies with topic; SP–Varies with topic) Colloquium in specialized topics in natural resources.</td>
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**French (Fren)**

**Department of French and Italian**

**College of Liberal Arts**

**Fren 0001. Reading French in the Arts and Sciences.** (0 cr; S–N only) Basic reading knowledge of French language; intensive reading and translation of texts from a wide variety of disciplines. Students successfully completing the course obtain Language Certification in French which satisfies a Graduate School requirement.

**Fren 1001. Beginning French.** (4 cr) Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

**Fren 1002. Beginning French.** (4 cr; SP–1001 or equiv) Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

**Fren 1003. Intermediate French.** (4 cr; SP–1002 or Entrance Proficiency Test) Development of listening, reading, and writing skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration.

**Fren 1004. Intermediate French.** (4 cr; SP–1003 or Entrance Proficiency Test) Development of listening, reading, writing, and speaking skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration.

**Fren 1022. Accelerated Beginning French.** (4 cr; SP–2 or more yrs high school French) For students who have studied Beginning French in high school or at community colleges and who do not place high enough on placement exam to enter 1003. An accelerated review of Fren 1001 followed by the material covered in Fren 1002.
Fren 1102. Beginning French II, Transition. (3 cr; QP—French 1101; A-F only) Basic listening, speaking, reading, and writing skills. Emphasizes communicative competence. Cultural readings.

Fren 1103. Beginning French III, Transition. (3 cr; QP—1102; A-F only) Basic listening, speaking, reading, and writing skills. Emphasizes communicative competence. Cultural readings.

Fren 3010. French Expression. (3 cr [max 6 cr]) Intensive work in oral/written communication.


Fren 3015. Advanced French Grammar and Communication. (4 cr; SP—1004 or equiv or #) Advanced study of French with particular emphasis on grammar review, vocabulary building, oral communication skills, and language usage in cultural contexts.

Fren 3016. Advanced French Composition and Communication. (4 cr; SP—3015 or equiv or #) Advanced study of grammar in context; emphasis on writing for varied communicative purposes, reading for style and content, translation.

Fren 3018. French Oral Communication. (3 cr; SP—3014, 3015) Intensive work in oral expression, listening comprehension. Incorporates wide variety of cultural topics.

Fren 3019. French Diction and Speaking. (2 cr; SP—3014) The relationship between the written and the spoken word in French. Learn to read prose and poetry aloud from a text using appropriate French pronunciation, etc. Leads to play readings and possible performance.

Fren 3022. The Language and Culture of Business in France. (3 cr; SP—3015; completion of 2016 recommended) Examines French business language as well as business practices and culture in France. Includes cross-cultural analysis.

Fren 3101W. Introduction to French Literature. (4 cr; SP—3015 or equiv) Close critical analysis of poetry, prose fiction, and plays. Introduction to literature and methods of literary analysis.

Fren 3110. Medieval Stories. (3 cr; max 9 cr; SP—3010) Reading/overview survey of medieval tale (comic, bawdy, moralizing, fantasy, historical) in modern French translation. Explores their relationship to development of French culture, especially urbanization, class relations, marriage, role of Church.

Fren 3171. The Unruly Subject(s) of Classicism: Writing, History, Power in Ancient Regime France. (3 cr; SP—3011 or equiv) The formation of subjectivity in the literature and culture of 17th- and 18th-century France. Aesthetics of classicism, consolidation of state power, and representations of the individual in theater, novel, and prose.

Fren 3172. The Court Society: Literature, Culture, Spectacle. (3 cr; SP—3011) Examines the court and salon society in 17th-century France. The production of taste, sociability, and national identity is considered in literature, painting, architecture, and the plastic arts.

Fren 3181. Mapping Enlightenment in 17th- and 18th-Century French Prose. (3 cr; SP—3011) The themes, values, and critical strategies of the social and intellectual movement designated by the term Enlightenment. The legacy of the Enlightenment project will also be evaluated.

Fren 3251. French Poetry. (3 cr; SP—3011) The historical, political, and social contexts of the evolution of French poetry from its origins to the modern era. While studying primarily lyric poetry, epic and dramatic poetry may also be considered when appropriate.

Fren 3261. Dramas of Culture: 20th-Century French and Francophone Theater. (3 cr; SP—3011) Key movements, dramatists, and contexts of 20th-century French and Francophone theater. Areas of study include naturalist and symbolist legacies as well as existentialist, avant-garde, and contemporary performance and drama.

Fren 3280. The Indispensables: French Texts to 1789. (3 cr; max 9 cr; SP—3011) Explores students to some essential works in French which were characteristic in their time or influential later. Works of all genres will be read. The actual works read will differ according to instructor preference. Taught in French.

Fren 3321. Producing the Bourgeois Subject: The Sense of Self in 18th-Century French Literature. (3 cr; SP—3011) Examines the role of 18th-century literature in shaping the notion of self and social identity. Attention is given to the novel and its relation to new reading practices and publics.


Fren 3323. Literature of Revolution and Upheaval. (3 cr; SP—3011) A study of revolutionary movements in France seen through novels placed in historical context. Context may vary, but course will deal with radical historical, cultural and literary changes in France primarily in the modern period.

Fren 3324. Legal Issues in French Novels Since the Revolution. (3 cr; SP—3011) The importance of legal issues in French novels. Analyze the impact of lawyers, judges, witnesses, the police, etc. on individuals and interpersonal relationships. Examine how novelists short-circuit the legal system and create alternative ways of settling disputes.

Fren 3350. Topics in Literature. (3 cr [max 9 cr]) Focuses on a problem, period, author, or topic of interest. Specific content posted in department and listed in Course Guide.

Fren 3368. Coming of Age. (3 cr; SP—3011) A study of the literature of education and of the process of youth coming to terms with society. Readings will vary and will be drawn from a number of time periods.

Fren 3371. Writing Crisis in (Post) Modern Times. (3 cr; SP—3011) Examines the meaning and purpose of the notion of crisis in French novels. How crises, be they personal, social or political, prompt writers to create new modes of (dis)connecting with other persons, institutions, and society.

Fren 3382. Modern Times: Literature of the 19th and 20th Centuries. (3 cr; SP—3011) Variously emphasizing the two centuries. Sample topics include: esthetic currents (Realism and the novel); cultural considerations (gendered representations); philosophical concerns (the relation of individuals to the social body in civil society).

Fren 3401. Québecois Literature. (3 cr; SP—3011) Study writing produced in Quebec as a literature of its own, not simply as a part of Canadian literature. Literature will be studied in relation to other North American literatures and to Francophone literature produced elsewhere in the world.

Fren 3479. Francophone Writers of the African Diaspora. (3 cr; SP—3011) Literature from Francophone North Africa, Africa, the Caribbean of the colonial and/or post-colonial eras, examined in its historical, cultural, or ideological contexts. Reading selections may include texts by immigrant or exiled writers in France.

Fren 3501. Structure of French: Phonology. (3 cr; SP—5530; 3014, 3015, Ling 3001 or #) Advanced study of the sound system of contemporary French.

Fren 3502. Structure of French: Morphology and Syntax. (3 cr; SP—3502; 3011, Ling 3001 or #) Linguistic study of contemporary French word forms (inflectional and derivational morphology); introduction to French syntax (linguistic study of grammar) and characteristic syntactic constructions.


Fren 3531. Sociolinguistics of French. (3 cr; SP—5531; 3015, Ling 3001 or #) Examines variation in the use of French associated with factors such as medium (oral/written), style (formal/informal), region, social and economic groups.

Fren 3601. French Civilization and Culture I. (3 cr; SP—3015) Roman occupation of Gaul to 1715.

Fren 3602. French Civilization and Culture II. (3 cr; SP—3015) 1715 to present.

Fren 3650. Topics in French/ Francophone Cultures. (3 cr [max 9 cr]; SP—3015) Focus on aspects of French and/or Francophone cultures in various historical, social, political, and geographical contexts.

Fren 3701. Reading Libertinage: Dangerous Lessons in Translation. (3 cr; SP—Not for majors) Designed for non-majors, this course examines libertinage and the libertine in French literature of the 17th and 18th centuries. Literary forms will be examined as ways to produce and question desire. Taught in English; all readings in English.


Fren 3706. Québec: Literature and Film in Translation. (3 cr; SP—Not for majors) A survey of Quebec literature and film in English or with subtitles. Particular attention paid to cultural tensions as well as to the impact of women writers and filmmakers on genre.

Fren 3801. Cinema and Culture: The City of Paris. (3 cr; SP) How French cinema, from the silent era to the present, reflects and constructs the pleasures and anxieties of urbanization, new modes of entertainment, and new cultural roles for men and women. Taught in English. Knowledge of Italian and French helpful but not necessary.

Fren 4101W. Seminar in French Studies. (3 cr; SP—Completion of all pre-elective requirements for major or permission of DUS.) Reading and discussion of contemporary issues in French studies and workshop on senior projects.

Fren 4510. Topics in French Linguistics. (3 cr [max 9 cr]; SP—3502 or #) Topics to be selected from French syntax, pragmatics, discourse analysis, or sociolinguistics.

Fren 4970. Directed Readings. (1-4 cr [max 9 cr]; SP—) Designed to meet unique requirements agreed upon by a faculty member and a student. Individual contracts are drawn up listing contact hours, number of credits, written and other work required. Each contract will vary.

Fren 5251. Promenades Poétiques: The Subject in Motion. (3 cr; SP—3111 or above) The search for the subject in poetry and poetic prose as revealed through the motif of the “promenade” and experimentation with literary forms.

Fren 5261. The Return of Tragedy. (3 cr; SP—3111 or above) Tragedy as dramatic form in relation to social order, myth and history, and theatre.
Course Descriptions

Fren 5271. “To Change or not to Change?” Speculations on (Post) Modern French Texts. (3 cr; SP–3111) The meaning and purpose of the notion of “change” in French novels. Explore how a multiplicity of causes produces major changes in an individual’s personal and public life. The notion of change as it relates to financial and intellectual speculation.

Fren 5301. Critical Issues in French Studies. (3 cr; SP—# for undergrads) Introduces the methods of interpretation and critical debates that have shaped and continue to define the discipline of French studies. Provides a practical introduction to graduate-level literary research.

Fren 5350. Topics in Literature and Culture. (3 cr [max. 12 cr]; SP–3101 or equiv) Problem, period, author, or topic of interest. See Class Schedule.

Fren 5479. Post-Colonial Francophone Literatures. (3 cr; SP–3111 or above) Francophone literature from North Africa, Africa, and the Caribbean of the colonial and/or post-colonial era in the light of relevant literary and cultural theories.

Fren 5501. Structure of French: Phonology. (3 cr; SP—§5001, §5001A or §5001A) Basic concepts of phonetics and phonology, and understanding of the sound system of French.

Fren 5502. Structure of French: Morphology and Syntax. (3 cr; SP—§5002; §5001 or #) Linguistic study of modern French word forms (inflexional and derivational morphology); introduction to French syntax (linguistic study of grammar) and characteristic syntactic constructions.

Fren 5531. Sociolinguistics of French. (3 cr; SP—§5351; §5001 or §5001A) Explores variation in the use of French associated with factors such as medium (oral/written), style (formal/ informal), region, social and economic groups.

French and Italian (Frit)

Department of French and Italian College of Liberal Arts

Frit 3802. Cinema and Realism. (3 cr) Examines French poetic realism, relating it to two other periods of realist film, Italian Neorealism and American film noir. Taught in English.

Frit 3803. New Wave Cinema. Love, Alienation and Landscape in Post-WWII Italian and French Film. (3 cr) Modernist Italian and New Wave French cinema after WWII, focusing on film syntax, constructions of gender, and the individual’s relationship to the modern urban and rural landscape. Taught in English.

Frit 5257. Passionate Beings: Literary and Medical Humanities in Italy and France from 1800 to the Present (4 cr) Literary and medical representations of the passions in France and in Italy from 1800 to the present. Texts range from theatrical works to medical treatises on the pathological life. The notion of love as a way for exploring notions of subjectivity, responsibility, order. Taught in English.


General College (GC)

General College

GC 0623. Geometry/Programmed Study. (0 cr; QP—0623 or equiv; SP—[4 cr equiv]; §0721 or GC math placement; BC; UC only; A-F only) Basic geometric concepts/logic: measurement, angles, polygons, plane geometric figures, three-dimensional figures, relations among angles, constructions. Programmed study: students complete course requirements in time frame established by instructor.

GC 0643. Mathematics: Programmed Study. (0 cr; [4 cr equiv]; BC; UC only; A-F only) Basic mathematics, elementary algebra, or intermediate algebra for students who need to learn math at their own pace. Instructor assigns topics for each student based on first-day test.

GC 0711. Introduction to Basic Mathematics. (0 cr; SP—[4 cr equiv]; §616, §615, §1434; BC; IDL only; A-F only) Problem-solving. Concepts/procedures of basic math. Whole numbers, fractions, decimals, ratios, percents, geometric concepts, signed numbers, variables, simple algebraic equations, word problems.

GC 0712. Introductory Algebra, Part I. (0 cr; QP—0611 or 0615 or equiv; SP—[4 cr equiv]; §616, §621, §716, §721, §722, §1435; GC math placement; BC; A-F only) Learning/using behaviors that increase probability of success in mathematics courses. Properties, concepts, and procedures of arithmetic fractions, percents, unit conversions, and simple geometric figures. Signed numbers, equations, inequalities, algebraic word problems.

GC 0713. Introductory Algebra, Part II. (0 cr; SP—[4 cr equiv]; §616, §621, §716, §721, §722, §1435; §0721, §0712, #; BC; A-F only) Learning/using behaviors that increase the probability of success in mathematics courses. Rectangular graphs, exponents, polynomials, factoring, rational expressions, linear modeling, algebraic word problems. Continuation of 0712.

GC 0716. Introductory Algebra, Part I (Computer). (0 cr; QP—0611 or 0615 or equiv; SP—[4 cr equiv]; §616, §621, §716, §721, §722, §1435; GC math placement; BC; A-F only) Learning/using behaviors that increase probability of success in mathematics courses. Properties, concepts, and procedures of arithmetic fractions, percents, unit conversions, and simple geometric figures. Signed numbers, equations, algebraic word problems. Computer multimedia presentation: no lectures.

GC 0717. Introductory Algebra, Part II (Computer). (0 cr; SP—[4 cr equiv]; §616, §617, §621, §713, §721, §722, §1435; §0721, §0712, §0716, #; BC; A-F only) Learning/using behaviors that increase the probability of success in mathematics courses. Rectangular graphs, exponents, polynomials, factoring, rational expressions, linear modeling, algebraic word problems. Continuation of 0712 or 0716. Computer multimedia presentation: no lectures.

GC 0721. Introductory Algebra (Computer). (0 cr; QP—0611 or 0615 or equiv; SP—[4 cr equiv]; §616, §617, §621, §713, §716, §721, §722, §1435; GC math placement; BC; A-F only) Concepts/procedures of algebra I. Signed numbers, expressions, equations, inequalities, systems, exponents, polynomials, factoring, rational expressions, graphs, word problems.

GC 0722. Introductory Algebra (Computer). (0 cr; QP—0611 or 0615 or equiv; SP—[4 cr equiv]; §616, §617, §621, §713, §716, §721, §722, §1435; GC math placement; BC; A-F only) Concepts/procedures of algebra I. Signed numbers, expressions, equations, inequalities, systems, exponents, polynomials, factoring, rational expressions, graphs, word problems. Computer multimedia presentation: no lectures.

GC 0731. Intermediate Algebra. (0 cr; QP—Grade of at least C in [0625 or equiv]; SP—[4 cr equiv]; §616, §615, §621, §625, §713, §714, §721, §722, §1445; §1446; grade of at least C in [0713 or 0717 or 0721 or 0722] or GC math placement; BC; A-F only) Absolute value, systems. Linear, quadratic, rational, exponential, logarithmic functions. Radicals, conic sections, sequences, series, binomial theorem, test questions, and interpreting technical vocabulary. For non-native speakers of English only. Paired with a designated content course.

GC 0742. Reading in the Content Area. (2 cr; SP—CE enrollment; BC) Practice reading skills and strategies for a content area. Previewing and predicting content and organization, note taking, outlining, anticipating test questions, and interpreting technical and subtechnical vocabulary. For non-native speakers of English only. Paired with designated content course.

GC 1011. Introduction to College Writing: Workshop. (2 cr; SP—§1407, §1421 or §1422; BC) For non-native speakers of English enrolled in GC 1421 or GC 1422. Develop language editing strategies through review of linguistic features of standard written English and attention to style and language in writing. Small-group activities and in-group or individual conferences.


GC 1081. Academic Development Seminar: Supplemental Instruction in Social Sciences. (1 cr; SP—specific content course, adviser approval after one 1081-1085 regis; BC; A-F only) Introduces students to successful methods of study in social science courses: note taking, exam preparation, and time management. Includes specific writing tasks, critical thinking, research methods, and essay and presentation styles associated with disciplinary content.

GC 1082. Academic Development Seminar: Supplemental Instruction in the Sciences. (1 cr; SP—specific content course, adviser approval after one 1081-1085 regis; BC; A-F only) Introduces students to successful methods of study in science courses, including note taking, exam preparation, and time management. Specific problem solving techniques, augmented problem sets, writing tasks, and presentation styles associated with disciplinary content.

GC 1083. Academic Development Seminar: Supplemental Instruction in the Humanities. (1 cr; SP—specific content course, adviser approval after one 1081-1085 regis; BC; A-F only) Introduces students to successful methods of study in humanities courses: note taking, exam preparation, and time management. Specific writing tasks, critical thinking skills, research methods, and essay and presentation styles associated with disciplinary content.