Course Descriptions

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Course Descriptions

Course Numbers, Symbols, and Abbreviations

The courses in this catalog are current as of March 25, 2004. Check the University Catalogs Web site at www.catalogs.umn.edu for the most current course information. The courses in this catalog are not offered every semester. To find out whether a course is offered during a particular semester, consult the online Class Schedule at http://onestop.umn.edu/registrar/registration/courses.html.

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.

Course 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 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.

§ 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.

Prereq Course prerequisites.
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.
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.
A-F, S-N, NGA Grading options. NGA means “no grade associated.” If no grading option is listed, the course may be taken either A-F or S-N. For more information about grading, see page 29.

Course Listing Sample

Xology

Xology and Diometrics

College of Liberal Education

Xolo 3101. Methods in Xology. (3-4 cr [max 8 cr]; A-F only. §5101. Prereq–3100 or #)

Historical, numerical, sociological, and Freudian methods of research in xology with applications to contemporary problems.

Credit will not be granted if credit has been received for the course listed after this symbol.
Academic Health Center Shared (AHS)
Academic Health Center Office of Education
Academic Health Center Shared
AHS 1101. Orientation to the Health Sciences. (1 cr)
Interest/personality assessment, health-related academic majors/professions, professionalism/ethics in health care. Students integrate information about self and career-related information to move towards a major and career choice.

Accounting (Acct)
Department of Accounting
Curtis L. Carlson School of Management
Acct 2050. Introduction to Financial Reporting. (4 cr; A-F only. Prereq-30 3 cr)
Introduction to financial accounting for U.S. organizations. Reading financial statements.

Acct 3001. Introduction to Management Accounting. (3 cr; A-F only. Prereq-3000, at least 30 cr)
Costing techniques, including activity-based costing. Applying costing methods to determine costs of products, services, and production processes. Use of costs in operating/strategic decisions.

Acct 3199. Internship in Public Accounting. (2 cr; S-N only. Prereq-5101, #)
Full-time work for a public accounting firm plus a written report on the work experience.

Acct 3201. Intermediate Management Accounting. (2 cr; A-F only. Prereq-3001, acct or finance major)
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; S-N only. Prereq-Accct 2011, #)
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; A-F only. Prereq-Mgmt student, non-accounting major)
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. Intermediate Accounting I. (4 cr; A-F only. Prereq-Grade of at least B- in 2050, mgmt major or mgmt grad student)
Valuation, measurement, and reporting issues related to selected assets/liabilities of a firm. Theory underlying accounting issues. Applying accounting principles.

Acct 5102. Intermediate Accounting II. (4 cr; A-F only. Prereq-5101, mgmt or grad mgmt student)
Basic valuation problems encountered in financial reporting. Focuses on valuation of liabilities. Accounting for leases, pensions, and deferred taxes. Introduces consolidated financial statements.

Acct 5125. Auditing Principles and Procedures. (4 cr; A-F only. Prereq-[3101/5101 or 5100/6100], [accounting major or grad mgmt student])
Auditing financial information systems. Independent audits and internal auditing. Ethics. Legal responsibilities.

Acct 5126. Internal Auditing. (2 cr; A-F only. Prereq-[3101/5101 or 5100/6100], 3001)
Financial and operational auditing. Standards. Managing the function.

Acct 5135. Fundamentals of Federal Income Tax. (4 cr; A-F only. Prereq-2050 or 8030 or 8130, [mgmt or grad mgmt student])
Introduction to the U.S. federal system of taxation. Concepts of gross income, deductions, and credits. Analysis of the structure 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; A-F only. Prereq-[5100/6100 or 3101/5101] [accounting or finance major])
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; A-F only. Prereq-5102, mgmt or mgmt grad student)
Theory underlying the preparation of consolidated financial statements, as well as the mechanical computations needed to prepare the statements themselves.

Acct 5236. Introduction to Taxation of Business. (2 cr; A-F only. Prereq-5135, acct major)
Introduction to the income 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. Prereq-3101/5101 or 5100/6100)
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; A-F only. Prereq-5102, mgmt or grad mgmt student)
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; A-F only. Prereq-5102, mgmt student)
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 a variety of financial statements produced in countries other than the United States.

Acct 5320. Current Topics in Accounting. (2 cr; A-F only. Prereq-5102, acct major)
Topics vary.

Adult Education (AdEd)
Department of Work, Community, and Family Education
College of Education and Human Development
AdEd 5001. Survey: Human Resource Development and Adult Education. (3 cr)
Overview of fields of human resource development and adult education. Includes societal context, systems theory, processes, definitions, philosophies, goals, sponsoring agencies, professional roles, participants, and resources. Emphasis on the unique characteristics and ways the fields overlap and enhance one another.

AdEd 5101. Strategies for Teaching Adults. (3 cr; A-F only)
Psychological theories of adult learning; learning styles and personality types; teaching styles; group and team learning; moderating and study circles; teaching technologies and distance learning; gender, race, and cultural communication. Applications of strategies.

AdEd 5102. Perspectives of Adult Learning and Development. (3 cr)
Emphasis on major adult development theorists, theories, and current applications. Transformative learning, self-directed learning, experiential learning, and cooperative learning provide theoretical framework for exploring physiological, psychological, sociological, and cultural aspects of adult development through the life span.

AdEd 5103. Designing the Adult Education Program. (3 cr; A-F only)
Designing and implementing educational programs for adults. Application of concepts, philosophies, and models in different adult learning situations.

AdEd 5196. Field Experience in Adult Education. (3-6 cr or 5 cr; S-N only)
Supervised fieldwork and practice. Presentations and evaluations of adult education practices.

AdEd 5201. Introduction to Adult Literacy. (3 cr. §5211, §5212)
Definitions of literacy: workplace, community and family. Issues: poverty, welfare, ethnicity, cultural diversity, social class, language and learning, immigrants. Review of literacy programs, funding, and professionalization. Reading and recruiting undereducated adults. Role of family, schools, community, and state/local government. New social action approaches required for licensure.

AdEd 5202. Assessment of Adult Literacy. (3 cr. §5224, §5225, §5226)

AdEd 5203. Methods of Teaching Adult Literacy. (3 cr. §5233, §5234, §5235)

AdEd 5211. Introduction to the Undereducated Adult. (1-3 cr; A-F only §5201)
Definitions of literacy in workplace, community, and family. Issues: poverty/welfare, ethnicity, cultural diversity, social class, language/learning, immigrants.

AdEd 5212. Introduction to Adult Literacy in the Workplace. (1 cr; A-F only §5201. Prereq-5211)
Review workplace literacy programs, funding, program planning, and needs assessment. Reaching/recruiting workers. Role of employers and the unions. Writing for low literacy employees.

AdEd 5213. Introduction to Adult Literacy in the Community. (1 cr; A-F only §5201. Prereq-5211)
Reviews role of the community programs in the United States in literacy building, the family in developing literacy skills, correctional education in reintegrating offenders back into community. Integrating people with disabilities through community literacy programs. Literacy development in developing countries. Reaching/recruiting indigenous, migrant, and immigrant groups. Social action approaches to literacy education.

AdEd 5224. Formal Assessment of Adult Literacy. (1 cr; A-F only §5202. Prereq-5211)
Assessment of adult English/literacy skills needed for work, family, community, and continuing education. Formal testing policy, techniques, standardized tests. Underlying assumptions about testing, cultural bias, and interpretation of formal tests. Test preparation programs.

AdEd 5225. Informal Assessment of Adult Literacy. (1 cr; A-F only §5202. Prereq-5221)
Informal assessment of adult English/literacy skills for work, family, community, and further education. Informal testing techniques, setting educational goals, formal versus informal assessment.
Course Descriptions

AddE 5226. Advanced Assessment of Adult Literacy. (1 cr; A-F only. §5202. Prereq–5211, 5224, 3225) Analysis and synthesis of educational planning for work, family, and community.

AddE 5233. Methods of Teaching Beginning Adult Literacy. (1 cr; A-F only. §5203. Prereq–5211) Learning English and literacy as an adult: initial approaches to teaching reading, writing, and communication skills. Theories of learning and curriculum design. Technology as a teaching tool: teaching students with disabilities or with cultural/ gender differences.


AddE 5235. Methods of Teaching Advanced Adult Literacy. (1 cr; A-F only. §5203. Prereq–5211, 5234) Advanced approaches to teaching reading, writing, and communication skills. Preparing students for college and continuing education. Reading/study skills. English in workplace and in Internet. Problem solving, analytical thinking. Technology as teaching tool. Evaluating commercial material/software.

AddE 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.

AddE 5303. Working with Volunteers in Community Settings. (3 cr) Uses collaborative, experiential methods to address fundamental issues and practices in volunteer development. Explore personal philosophies, staffing, and key issues and trends in the administration of volunteer programs.

AddE 5401. Distance Learning in Adult Education and Training. (3 cr; A-F only) Distance learning concepts, theory, history, present practice, delivery systems, course design, major issues, and future directions.


AddE 5700. Special Topics in Adult Education. (1-8 cr [max 12 cr]) Exploration of issues, methods, and knowledge in areas of adult education. Content varies.

Aerospace Engineering and Mechanics (AEM) Department of Aerospace Engineering and Mechanics

Institute of Technology


AEM 3031. Deformable Body Mechanics. (3 cr; A-F only. Prereq–[Phys 2311 or 2311W, Math 2373 or equiv], [Math 2374 or equiv], [IT upper div or grad student]) First course in fluid mechanics. Stress/strain rate descriptions, fluid statics. Use of differential and finite control volume analysis with continuous media. Momentum/energy equations, Bernoulli/Euler equations, vorticity, potential flow, incompressible viscous flow using Navier-Stokes equations, dimensional analysis, pipe flow, boundary layers, separation, transition to turbulence.


AEM 4301. Spaceflight Dynamics. (3 cr. Prereq–[2012 or equiv], [Math 2373 or equiv], [Upper div or grad student]) Two-body problem, Earth-satellite operations, rocket performance, reentry dynamics, space environments, restricted three-body problem, interplanetary trajectories, numerical simulations, elementary spacecraft attitude control. Design project.


AEM 4331. Aerospace Vehicle Design I. (3 cr. Prereq–[2301, AEM sr or #], [EngC 1011 or equiv]) Students work in teams/disciplines to design aerospace vehicle. Design process, project environment, mission requirements, trade studies, vehicle sizing, performance, stability/control, propulsion, trajectory analysis, CAD/vehicle integration, systems/equipment, operating envelopes, baseline specification, certification. Professional ethics/responsibilities. Students keep design log. Oral presentation, written report.

AEM 4332W. Aerospace Vehicle Design II. (4 cr. Prereq–[4331 or #], [EngC 1011 or equiv]) Students work in project groups to design/build/test model of vehicle designed in 4331. Design proposals, schedules/milestones/critical-path, CAD/CAM, drawings/specifications, control systems, weight/balance envelopes, test matrix, structural analysis/testing, wind tunnel/water channel testing, flight testing, certification. Professional ethics. Design log, status reports, written report, oral presentation.


AEM 4495. Problems in Dynamics and Control. (1-3 cr [max 6 cr]. Prereq–A) Topics of current interest. Individual projects with consent of faculty sponsor.

AEM 4501. Aerospace Structures. (3 cr; A-F only. Prereq–IT upper div or grad, 3031 or equiv) Advanced strength of materials analysis of elastic structures with aerospace applications; failure modes and criteria, buckling, matrix methods for analysis, 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. Prereq–[Grad of at least C in 4501, [IT upper div or grad student]) or #) Application of finite element methods to problems in structural analysis. Emphasizes properly posing problems and interpreting calculation results. Use of commercial FEA packages. Introduction to theory of finite elements.


Course Descriptions

AEM 4601. Instrumentation Laboratory. (3 cr. Prereq–CSci 1113, EE 3005, EE 3006, [upper div IT or grad student]) Introduction to lab instrumentation. Computerized data acquisition. Statistical analysis of data. Time series data, spectral analysis. Transducers for measurement of solid, fluid, and dynamical quantities. Design of experiments.


AEM 4796. Professional Experience. (1-3 cr [max 3 cr]; A-F only. Prereq–IT upper div, AEM major, ∆) Work experience with substantive engineering component. Written report. Number of credits awarded based on extent of experience.


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

AEM 4896. Industrial Assignment. (2 cr [max 8 cr], Prereq–IT upper Div, AEM major, Regis in AEM Internship Program, ∆) Engineering internship in industry. Technical report required.


AEM 5251. Computational Fluid Mechanics. (3 cr; A-F only. Prereq–4201 or CS 1113 or equiv, [IT upper div or graduate student]) Introductory concepts in finite difference and finite volume methods as applied to various ordinary/partial differential model equations in fluid mechanics. Fundamentals of spatial discretization and numerical integration. Numerical linear algebra. Introduction to engineering and scientific computing environment. Advanced topics may include finite element methods, spectral methods, grid generation, turbulence modeling.


AEM 5431. Trajectory Optimization. (3 cr; A-F only. Prereq–4311 or equiv or #) Parameter optimization problems. Topics in calculus of variations; necessary conditions of nonlinear optimal control problems; classification of trajectory optimization algorithms; steady-state aircraft flight; minimum-time climb aircraft trajectory; aerosisted orbital transfer trajectories; optimal space trajectories.

AEM 5441. Structural Dynamics. (3 cr; A-F only. Prereq–3031, 4301, [grad student or IT upper div]) Frequency and time domain analysis of multi-degree of freedom mechanical systems. Natural frequencies, normal modes of vibration. Free and forced vibrations of strings, rods, and shafts beams. Introduction to finite elements in structural dynamics. Design project.

AEM 5451. Optimal Estimation. (3 cr; A-F only. Prereq–5481 or §5481 or equiv) Basic probability theory. Batch/recursive least squares estimation filtering. Linear and nonlinear systems using Kalman and Extended Kalman Filters. Applications to sensor fusion, fault detection, and system identification.

AEM 5495. Topics in Aerospace Systems. (1-4 cr [max 4 cr]; A-F only. Prereq–∆) Topics of current interest. Individual projects with faculty sponsor.

AEM 5501. Continuum Mechanics. (3 cr. Prereq–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; A-F only. Prereq–4501 or equiv, Math 2263 or equiv or #) 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.

AEM 5651. Aeroelasticity. (3 cr; A-F only. Prereq–4202, 4301, [grad student or IT upper div]) Static aeroelastic phenomena, torsional divergence of a lifting surface, control surface reversal. Aeroelastic flutter, unsteady aerodynamics. Problems of gust response, buffetting. Design project.

Aerospace Studies (Air) Department of Aerospace Studies (Airforce ROTC) Office of the Executive Vice President and Provost Air 1000. Leadership Laboratory. (1 cr [max 1 cr]; S-N only) Air Force customs and courtesies, drill and ceremonies, military commands, the environment of the Air Force officer, and learning about areas of opportunity available to commissioned officers. Interviews, guidance, and information to increase the understanding, motivation, and performance of other cadets.

Air 1104. Introduction to the Air Force Today I. (1 cr; A-F only) Mission and organization of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer opportunities, group leadership problems, and introduction to communication skills.

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 Airpower and Communication Skills. (2 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 followership, Officership, ethics, and values; Air Force’s core values. Air Force heritage and leaders, Quality Air Force, group leadership problems, and continuing application of communicative skills.

Air 3301. Air Force Leadership, Quality, and Communication. (2 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 Office Skills, Quality, and Communication. (3 cr; A-F only. Prereq–3301 recommended) Focus on completing Quality Air Force training, learning the Officer Professional 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, officer, civic 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.

African American Studies (Afro) Department of African American and African Studies College of Liberal Arts

Afro 1011. Introduction to African American Studies. (4 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. (4 cr) Diverse themes and disciplines in African Studies from prehistory to post-colonial period. Introduction to methodologies of inquiry.


Air 1221. Beginning Swahili. (5 cr) Introduction to basic skills: comprehension, speaking, reading and writing.

Air 1222. Beginning Swahili. (4 cr. Prereq–1221 or equiv) Continuation of skill development from 1221.

Air 1902. Freshman Seminar. (3 cr [max 6 cr]; A-F only) Prereq–Fr with no more than 36 cr)

African American Studies (Afro) Department of African American and African Studies College of Liberal Arts

For definitions of course numbers, symbols, and abbreviations, see page 300.
Course Descriptions

Afro 1904. Caribbean Literature and the Search for Identity: A Survey. (3 cr; A-F only. Prereq- Fr or less than 20 cr)
Contemporary literary production from the Caribbean, originally conceived in or translated into English. Different genres (novel, poetry, film, short stories) are used to show how selected Caribbean writers attempt to foster a sense of awareness of and belonging to the Caribbean region. How writers negotiate burden of colonial legacy. Region’s history of slavery, its attendant stigmas. Fragmentation of Caribbean identity. Migration, exile, transnational, and diasporic realities.

Afro 1909W. Freshman Seminar. (3 cr; max 6 cr; A-F only. Prereq- Fr with no more than 36 cr)
Topics specified in Class Schedule.

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 3006. Impact of African Migrations in the Atlantic World. (3 cr; A-F only)

Afro 3016. The Black Family. (3 cr)
A sociological view of African American family life in the United States.

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 3110. Study of an African Language. (4 cr; max 8 cr; Prereq- Enrolled in Minnesota Studies in International Development in-country language course in [Swahili or Wolof or Twi])
Introduction to a selected African language. Emphasizes oral communication skills and cultural context.

Afro 3112. In the Heart of the Beat: the Poetry of Rap. (3 cr; A-F only)
Contemporary African American poetry as expressed by popular culture contributors. Students analyze/evaluate poems used in rap, in context of African American literature, American culture, and aesthetics.

Afro 3120. Social and Intellectual Movements in the African Diaspora. (3 cr; A-F only)

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. §Hist 3434)
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. §Hist 3435)
The history of South Africa from the Union to the present. Focus on such issues as African and Afrikaner nationalism, structures of apartheid, forced population removals, divestment and sanctions, and the post-apartheid era.

Afro 3225. Third Semester Swahili. (4 cr. Prereq- 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. Prereq- 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, and gender 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 American African 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. (4 cr)
Interdisciplinary study of the experience of African American women, including economic, political, and social factors, psycho-sexual development, and family roles.

Afro 3405. The African American Child. (3 cr)
Research carried out by African American psychologists and behavioral/social scientists, and by experts on African American child/youth development.

Afro 3429. Slavery in Africa and in the Americas, 1400 to 1800. (3 cr; A-F only)

Afro 3431. 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 3432. 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 3437. History of East Africa. (3 cr; A-F only)
Major themes in history of East Africa, from era of early human cultural development to present. Methods that historians use to reconstruct history. Varying interpretations/constructions of history over time.

Afro 3543. Psychology and the Black American Experience. (3 cr)
Historical and contemporary perspectives of the relationship between the area of psychology and African Americans in research and practice.

Afro 3578. Arts of Africa. (3 cr. §ArtH 3578)
Survey of the diverse arts of Africa, from ancient times to present. Visual arts of several civilizations. Relation of visual arts to larger cultural issues (religion, cosmology, gender, identity, political power).

Afro 3585. African American Art. (3 cr; A-F only)
Four hundred year history of African American art. How African Americans created artwork at specific times, in specific places. Arts of African Americans within their own communities, National arts movements, and African American life during historical junctures.

Afro 3591. Introduction to African American Literature. (4 cr)
Afro-American autobiography, fiction, essay, poetry, drama, and folklore from the late-18th century to the present.

Afro 3591W. Introduction to African American Literature. (4 cr)
African American autobiography, fiction, essay, poetry, drama, and folklore from late-18th century to 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 3594. Introduction to Contemporary Black Fiction. (3 cr; A-F only)
Major contemporary Black fiction writers, such as Gayle Jones, Ernest Gaines, Charles Johnson, Toni Morrison, Gloria Naylor, and John Edgar Wideman, among others, whose works span the period from 1970 to 1990.

Afro 3598. Arts of the African Diaspora. (3 cr. §ArtH 3598)

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 3625. Black Women Writers in the Diaspora. (3 cr)
Works of black women writers from Europe, Africa, South America, and the Caribbean. Novels, drama, films, and essays.

Afro 3626. Literature of African American Men: Sex, Family, and Relationships. (3 cr; A-F only)
African American male fiction writers’ approach to subject of family and relationships. Social, economic, and psychological consequences of racism/oppression, and effect on African American men writing about themselves within context of family/relationships. Manhood/masculinity as interpreted/articulated in fiction.

Afro 3628. Literature of Rebellion: the Amistad and other Revolts. (3 cr; A-F only)
Amistad affair and other slave revolts in fictional/ non-fictional texts. Nature of race/oppression. Historical representation of these specific incidents as settled in American consciousness. Responsibilities/challenges presented to authors in terms of accuracy, commercial viability, and literary quality. Introduction to issues concerning African American slavery.

Afro 3634. History of Blues and of Rhythm and Blues. (3 cr)
Black American culture as expressed by blues and by rhythm and blues. Evolution of blues from work songs and field hollars of slavery/emancipation through postwar blues sounds of Louis Jordan, through expressions of pre-rock-n-roll rhythm and blues, and to more current expressions of performers like Brian McKnight.
For definitions of course numbers, symbols, and abbreviations, see page 300.
Course Descriptions

Agricultural, Food, and Environmental Education (AFEE)

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. Analysis of occupations, employment potential, employee expectations for work. Use informational interviews to examine career options and employment portfolio for career planning.

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

AFEE 2096. Professional Practicum in Agricultural Education: Early Experience. (1-3 cr; A-F only)
- Observes school and 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. Prereq–AgEd major, #)
- Experiential learning in agricultural production and business. Plans, organized, monitored, and evaluated based on a per-experience diagnosis of learning prerequisite to higher level courses in technical agriculture and agricultural business.

AFEE 3112. Technical Drawing and Production Technologies. (3 cr; A-F only)
- Experiences in technical drawing, design technology, and production technologies related to construction and manufacturing. Develop manipulative skills and techniques; understand 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; A-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, personal leadership qualities, and vision for individuals and rural community organizations.

AFEE 5111W. 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. (3 cr)
- Development of community school program in agriculture, agribusiness, and environmental science. Program to meet graduation outcomes and determine student needs.

AFEE 5113. Adult Agricultural Education Program Development and Technology. (3 cr; A-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 adaptation.

AFEE 5116. Coordination of SAE Programs: Work-based Learning. (2 cr; A-F only. Prereq–Agricultural education major or #)

AFEE 5118. Strategies for Managing and Advising the FFA Organization. (2 cr; A-F only. Prereq–Agricultural education major or #)
- Principles/techniques to advise an FFA chapter. Historical/philosophical basis of FFA, organization/structure. Integration with classroom instruction, public relations, recruitment, and administration of FFA chapters.

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 projects, and national programs and resource material.

AFEE 5237. Mentorship for Supervising Agricultural Education Teachers. (2 cr)
- Professional development training for experienced teachers to serve as mentors for beginning and student teachers of agricultural education. Emphasis on supervision and assessment of teaching performance. Focus on critical period of induction into the teaching profession.

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. (3-3 cr; max 3 cr)
- Reflection, analysis on current problems and issues confronting beginning teachers of agricultural education. Issues in teacher and curriculum development, classroom instruction, FFA activities, and SAE development, school-to-work relationships.

AFEE 5290. Seminar: Current Issues in Agricultural Education and Extension. (1-3 cr; max 6 cr)
- Exploration of current issues in agricultural education and extension, strategies of response, implications of response actions, and related leadership roles.

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; modification 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, and 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.
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 1000H. Honors Colloquium. (2-3 cr [max 8 cr]; A-F only. Prereq–Admission to COAFES honors program or #) Topics vary by semester.

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

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

Agri 1910V. Topics: Freshman Seminar. (1-3 cr; A-F only) Interdisciplinary seminar. Topics specified in Class Schedule.

Agri 1910. Topics: Freshman Seminar. (1-3 cr; A-F only) Interdisciplinary seminar. Topics specified in Class Schedule.

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

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

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

Agronomy and Plant Genetics (Agro)

Department of Agronomy and Plant Genetics

College of Agricultural, Food and Environmental Sciences

Agro 1007. Horse in Your Backyard. (2 cr; A-F only) Role of horses in society. How to keep a horse well fed and healthy. Fundamentals of horse nutrition, feedstuffs, pasture, and horse health. How to seek/interpret information to make decisions on vaccination, worming, nutrition, grazing management, hay selection, manure handling, and use of dietary feed additives/enhancers.

Agro 1093. Directed Studies. (1-4 cr [max 12 cr]. Prereq– 4 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 plant use by humans. Lab, greenhouse, field, and classroom discussions.


Agro 1660. First-Year Colloquium/Experience in Agroecosystems Analysis. (2 cr; A-F only. Prereq–1st yr in major hosted by Department of Agronomy and Plant Genetics) Agroecosystems and their impacts on the environment, landscapes, and rural communities. Students develop a course plan within their major, explore career options, and increase their familiarity with the department, its history, and its faculty/staff.

Field trips, discussions, readings, reflective writings.

Agro 2101. Biology of Food, Land, People, and the Environment. (4 cr; A-F only) Biology base of food, land, people, and environmental systems. Their interface with social, economic, and political systems. Active learning, project-based course.

Agro 2104. Grain and Seed Technology. (2 cr. Prereq– Agro 1103, Agro 3411) recommended) Practice/principles of grain grading using Federal Grain Inspection Service (FGIS) standards with examples of commodity, classes, subclasses, defects, and special grades. Seed analysis identifying common crops and weed seeds. Seed laws, seed handling, conditioning/viability testing. Primarily laboratory discussion, practicum, and problem solving.


Agro 3203W. Environment, Global Food Production, and the Citizen. (3 cr. Prereq–Agro 3203. Prereq–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 4005. Applied Crop Physiology and Development. (4 cr [max 8 cr]. Prereq–Chem 1011 or Chem 1021 or equiv) Applications of plant physiology processes of water relations, photosynthesis, mineral uptake/function, transpiration, translocation, and their relationships to plant growth/development from seed germination to maturation and dry down for harvest. Emphasizes inquiry, field problems, and group activity. Lecture, laboratory.
Course Descriptions

Agro 4093. Directed Studies for Advanced Students. (1-4 cr; max 12 cr). Prereq. 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). S-N only. Prereq. COAFES undergrad. Complete internship contract available in COAFES Career Services before registering; UC only. Supervised professional experience in agribusiness firms or government agencies; evaluative reports and consultations with faculty advisers and employers.

Agro 4101. Agricultural Decision Making and Experimentation. (3 cr. Prereq. 1 or sr) Principles of field plot techniques and design applied to field demonstrations/experiments. Inductive/deductive reasoning, analysis of data, tests of significance. Treatment comparisons, decision making. Computers used for data processing and statistical analysis.

Agro 4103. World Food Problems. (3 cr. §ApEc 4103, §CAPS 4103, §FCst 4103. Prereq. Jr or sr or grad) Multi-disciplinary look at problems of and possible solutions for food production, storage, and utilization in developing regions. Presentations and discussions introduce conflicting views on population, use of technology, and ethical and cultural values held in various parts of the world.

Agro 4201. Agro-ecosystems and Crop Production. (3 cr. Prereq. 10 cr of biol and/or plant science) Basic concepts in agro-systems: organization, development, and function of field crop communities in contrast to natural ecosystems. Means of improving designed and managed systems for the benefit of mankind while minimizing impact on the ecosystem.

Agro 4401. Plant Genetics and Breeding. (4 cr. §HORT 4401. Prereq. [Biol 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 sexually propagated crops. Lab experiments in hybridization, variation, and selection.


Agro 4605. Management Strategies for Crop Production. (4 cr. Prereq. 1 or sr or grad student with program committee approval) Crop management situations/needs in various climate zones, soil types, from seed selection to crop storage. Focuses on cropping systems involving corn, soybeans, small grains, and forages. Emphasizes long term productivity, profitability, and sustainability. Lecture, discussion problem sets, laboratory.

Agro 4660. Senior Capstone: Leadership, Decision Making, and Problem Solving. (2 cr. Prereq. 4096 or §Agre 4009 or §Agri 4009) Professional leadership and decision making from ethical, technical, societal, and personal reflection perspectives. Linked to undergraduate internship and other experiential learning opportunities. Problems, decision-centered cases, interviews.

Agro 4888. Issues in Sustainable Agriculture. (2 cr. Prereq. [1103, Soil 1125] or 2125 or equiv) Agroecology, sustainable 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. Prereq. [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 5311. Research Methods in Crop Improvement and Production. (1 cr; S-N only. Prereq. Applied plant sciences graduate) Demonstrations and discussions of techniques in crop improvement and/or production research. Presentations integrate biotechnology with traditional breeding methods; production sessions emphasize ecologically sound cropping systems.

Agro 5321. Ecology of Agricultural Systems. (3 cr; A-F only) §Ent 5321. Prereq. [300x or above] course in [Agro or ArSc or Ent or Hort or Pifa or Soil] or # or # Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

Agro 5999. Special Topics: Workshop in Agronomy. (1-6 cr; max 6 cr. Prereq. Jr or sr or grad student) Workshops on various topics in agronomy and plant genetics. Presenters/Faculty may include guest lecturers/experts. Topics specified in Class Schedule.

Akkadian (Akka)

Department of Classical and Near Eastern Studies

College of Liberal Arts


Akka 5300. Readings in Akkadian. (3 cr; max 18 cr) Prereq. 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 1003. Indigenous Peoples: a Minnesota Perspective. (3 cr; A-F only) History, culture, and lived experience of American Indian people in Minnesota. Self-representation and histories of Anishinaabe (Ojibwe) and Dakota peoples through film, music, oral traditions, and written texts. Work by non-Indian scholars that focuses on distinctive cultural, philosophical, and linguistic perspectives of Anishinaabe and Dakota peoples.

Amln 1101. Beginning Ojibwe I. (1 cr) Acquisition of speaking skills, fundamentals of grammar, writing systems.

Amln 1102. Beginning Ojibwe II. (5 cr. Prereq. 1101) Acquisition of speaking skills, fundamentals of grammar, and writing systems.

Amln 1121. Beginning Dakota I. (5 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.

Amln 1122. Beginning Dakota II. (5 cr. Prereq. 1121) Further development of language acquisition skills with oral drills and in-class participation focused on questions and answers.

Amln 1902. Freshman Seminar. (3 cr; A-F only. Prereq. Fr or less than 30 cr) Topic specified in Course Guide.

Amln 1908W. Freshman Seminar. (3 cr; max 6 cr; A-F only) Topics specified in Class Schedule.

Amln 3103. Intermediate Ojibwe I. (5 cr. Prereq. 1101, 1102) Improving speaking skills; grammatical structures; storytelling, oral history, and translation projects.

Amln 3104. Intermediate Ojibwe II. (5 cr. Prereq. 1101, 1102, 3103) Improving speaking skills; grammatical structure; storytelling, oral history, and translation projects.

Amln 3107. Structure of Anishinaabemowin, the Ojibwe Language. (3 cr; A-F only. Prereq. 3103) Analysis of grammatical structures of Anishinaabemowin.

Amln 3108. History of Anishinaabemowin, the Ojibwe Language. (3 cr; A-F only. Prereq. 3107) Historical development of Anishinaabemowin.

Amln 3109. Anishinaabe Literature. (3 cr; A-F only. Prereq. 3103) Readings in Anishinaabe oral literature.

Amln 3123. Intermediate Dakota I. (5 cr. Prereq. 1122) Development of listening, speaking, reading, and writing skills with oral drills and in class participation focused on questions and answers.

Amln 3124. Intermediate Dakota II. (5 cr. Prereq. 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 3143. Language in American Indian Culture and Society. (3 cr; A-F only. §Anth 3103, §Anth 3143) Survey of North American indigenous languages in social/cultural contexts, from before European contact to present.

Amin 3201W. American Indian Literature. (3 cr) Comparative studies of oral traditions, modern literature from various tribal cultures.

Amin 3203. American Indian Aesthetics. (3 cr; A-F only) Ways in which American Indians have distinguished themselves as artistic thinkers. Regional traditions of American Indian art. Ways in which art was connected with everyday life and with religious practices. How American Indians thought about art differently from their Western counterparts. Innovations that contemporary American Indian artists have made in the way art is done and thought about by Indians/non-Indians.

Amin 3203W. American Indian Aesthetics. (3 cr; A-F only) Ways in which American Indians have distinguished themselves as artistic thinkers. Regional traditions of American Indian art. Ways in which art was connected with everyday life and with religious practices. How American Indians thought about art differently from their Western counterparts. Innovations that contemporary American Indian artists have made in the way art is done and thought about by Indians/non-Indians.

Amin 3301. American Indian Philosophies. (4 cr) World views of the indigenous peoples of the Americas. Topics include native medicines and healing practices, ceremonies and ritual, governance, ecology, humor, tribal histories, and status of contemporary native people.

Amin 3303. 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 3402. American Indians and the Cinema. (3 cr; A-F only) Representations of American Indians in film, historically/contemporary. What such representations assert about Native experience and cultural viability. What they reflect about particular relationships of power.

Amin 3409. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (3 cr) Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.


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 3713. 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 Euro-Americans.

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 oral traditions 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 Euro-Americans.

Amin 3920. American Indian Studies Topics. (1-3 cr; A-F only) Topics may include social history, oral history, history of particular regions, political systems, education, and policy. Designed for undergraduates.

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 U.S. (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 4300. American Indian Intellectuals. (3 cr; A-F only) Contributions that American Indians have made to understanding American Indian topics and the world around them. Works that have stood as paradigms of understanding American Indian topics and the world created by Great Lakes tribes was damaged, depressed, and altered but not destroyed by the arrival of Euro-Americans.

Amin 4301. American Indian Political Economy. (3 cr; A-F only) Sources, nature, consequences of social/economic development/change in Indian communities. Postcontact Indian communities. Effect of European contact. Social movements into 20th century, including phenomenon of urban Indian communities.

Amin 4551. Contemporary American Indian Movements. (3 cr; A-F only. Prereq–1001) American Indian organization 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 4525W. 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 4590. Topics in American Indian Studies. (1-4 cr; A-F only) Topics specified in Class Schedule.

Amin 4991. Independent Study. (1-12 cr; max 18 cr) Prereq–A, §Anth 3013, §Anth 3143) Individually arranged research with faculty to meet student needs and interests.

Amin 4996. Field Study. (1-12 cr; max 18 cr) Prereq–A, §Anth 3013, §Anth 3143) Opportunities for experiential learning in a variety of American Indian community settings. Consult department faculty at least one term before enrolling.

Amin 5107. The Structure of Anishinaabe, the Ojibwe Language. (3 cr; A-F only. Prereq–3101) Analysis of grammatical structures of Anishinaabemowin.

Amin 5108. History of Anishinaabemowin, the Ojibwe Language. (3 cr; A-F only. Prereq–5107 or #) Historical development of Anishinaabemowin.

Amin 5109. Anishinaabe Literature. (3 cr; A-F only. Prereq–5107 or 5107 or #) Readings in Anishinaabe oral literature.


Amin 5302. 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 5402. American Indians and the Cinema. (3 cr; A-F only) Representations of American Indians in film, historically/contemporary. What such representations assert about Native experience and cultural viability. What they reflect about particular relationships of power.

Amin 5409. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (3 cr) Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.

Amin 5890. Problems in American Indian History. (3 cr; A-F only. Prereq–#) 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.
American Sign Language (ASL)
Department of Educational Psychology
Course Descriptions

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 finger spelling; and deaf culture.

ASL 1702. American Sign Language II. (4 cr. Prereq–ASL 1701 or #)
Increased communication skill in American Sign Language (ASL); cultural values and behavioral rules of the deaf community in the U.S.; receptive and expressive activities; sign vocabulary; grammatical structure; receptive and expressive finger spelling; and aspects of deaf culture.

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

ASL 3704. American Sign Language IV. (4 cr. Prereq–ASL 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 finger spelling; 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 5 cr]; S-N only. Prereq–Fluency in ASL, #)
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 Sign Language (ASL)
Department of American Studies

Course Descriptions

College of Liberal Arts

AmSt 1001. American Popular Arts and Public Life, 1900-1940. (4 cr)
Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1001H. Honors: American Popular Arts and Public Life, 1900-1940. (4 cr. Spring 1001H. Prereq–Honors)
Interdisciplinary study of American society from precontact to industrialization. American literature, art, music, and popular culture in historical context.

AmSt 1002. American Popular Arts and Public Life, 1940 to present. (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 1401. Comparative Genders and Sexualities. (3 cr)
Gender and sexual practices/identities within a comparative (i.e., international) frame. How such practices/identities reflect/refract national ideals, that is, how gender and sexual practices express national/ international division.

AmSt 1902. Freshman Seminar. (3 cr; A-F only. Prereq–Fr or no more than 36 cr)
Topics specified in Class Schedule.

AmSt 1907W. Freshman Seminar. (3 cr; max 6 cr. A-F only)
Topics specified in Class Schedule.

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

AmSt 1909W. Topics: Freshman Seminar. (3 cr; A-F only)
Topics specified in Class Schedule.

AmSt 3001. Introduction to Asian American Studies. (3 cr)
History, cultural productions, and contemporary concerns of Americans of Chinese, Japanese, Korean, South Asian, Filipino, and Southeast Asian ancestry. Asian American communities looked at from various scholarly perspectives.

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. (2 cr)
Diverse cultural (racial, ethnic, class) groups in America. Institutions/processes that shape their relations and create domination, resistance, hybridity, nationalism, racism, alliance. Specific content may vary.

AmSt 3114. America in International Perspective. (3 cr)
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 3116. Jews and Popular Culture in 20th Century United States. (3 cr)
How theater, film, music, humor, and television were affected by Jews' innovations, social marginality, and wish to assimilate or resist assimilation to the culture. How the nation was and was not reshaped in the process.

AmSt 3252W. American Popular Culture and Politics: 1900 to 1940. (4 cr)

AmSt 3253W. American Popular Culture and Politics: 1940 to the Present. (4 cr)

AmSt 3299W. Junior Proseminar. (3 cr. Prereq–AmSt jr or #)
Classic/contemporary works/problems. Development of intellectual frameworks, aesthetic and symbol systems that form religious communities and contribute to religious conflicts in U.S. society and culture.

AmSt 3301. 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 3302. 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 the political ideologies affecting private life.

AmSt 3401. Workers and Consumers in the Global Economy. (3 cr. Prereq–American studies major or advanced undergrad or #)
Impact of global economy on workplaces/workers in the United States, Mexico, and Caribbean countries. Influence on consumption. Consequences for American culture/character. Effects on U.S./Mexican factory work, service sector, temporary working arrangements, offshore production jobs in Dominican Republic, and professional/managerial positions. How work/consumption is lived through race, class, gender, and nation.

AmSt 3501. 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 3502. Thought and Practice of American Religions. (4 cr. Prereq–#)
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 3920. Topics in American Studies. (1-4 cr [max 9 cr])
Topics specified in Class Schedule.

American Studies (AmSt)
Department of Animal Science

Course Descriptions

College of Agricultural, Food and Environmental Sciences

AnSc 1001. Orientation to Animal Science Pre-Vet. (1 cr; 5-N only)
Discussion of the Animal Science major with the Science/Pre-Vet emphasis, current issues, career planning, and professional development. Interviews with faculty and other resource persons.

AnSc 1007. Horse in Your Backyard. (2 cr; A-F only)
Role of horses in society. How to keep a horse well fed and healthy, nutrition, feedstuffs, pasture, health. How to keep/interpret information on vaccination, worming, nutrition, grazing management, hay selection, manure handling, and use of dietary feed additives/enhancers.

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 1012. 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, 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. (3 cr.)
For those without animal or nutrition training who have an interest in animal care. Nutrition of healthy animals and factors influencing 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 2011. Dairy Cattle Judging. (2 cr. Prereq-#)
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 2012. 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 2013. Beginning Livestock J judging. (2 cr. Prereq-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 2102. Horse Production. (3 cr.)

AnSc 2211. Biometrics for Livestock. (3 cr. 5 Agro 4104, 5902, # Stat 3111, 3301 or higher)

AnSc 2301. Systemic Physiology. (4 cr. Prereq-Biol 1009 or equiv)
Introduction to physiology of the neural, circulatory, respiratory, immune, and digestive systems of domestic animals.

AnSc 2401. Animal Nutrition. (3 cr. Prereq-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 3007. Equine Nutrition. (3 cr. Prereq-2401)

AnSc 3052. Equine Anatomy and Exercise Physiology. (4 cr. Prereq-2301, upper-division undergrad)
Interrelationship between physical structure and function. Emphasizes ways in which specialized aspects of anatomy/physiology contribute to unique athletic performance capabilities of horse.

AnSc 3141. Advanced Dairy J judging. (1 cr. Prereq-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 J judging. (2 cr. Prereq-2013 or #)

AnSc 3143. Meat J judging and Grading. (2 cr. Prereq-3151, #)
In-depth training in beef, pork, and lamb judging, writing reasons, and beef carcass grading and specifications. Field trips to packing plants. Students selected from course participate in intercollegiate meats judging contests.

AnSc 3203W. Environment, Global Food Production, and the Citizen. (3 cr. Agre 3203)
Ecological/ethical concerns of food production systems in global agriculture: past, present, and future. Underlying ethical positions about how agroecosystems should be configured. Interactive learning using decision cases, discussions, videos, other media.

AnSc 3221. Animal Breeding. (4 cr)
Application of qualitative and quantitative genetics to animal breeding; principles of artificial insemination. Genetics of livestock improvement through selection and mating programs.

AnSc 3305. Reproductive Biology in Health and Disease. (4 cr. Prereq-Biol 1009 or equiv)
Reproductive organ functions, fertilization, estrous cycle and endocrine control, reproductive efficiency, problems/principles of artificial insemination. Anatomy, physiology, biochemistry of mammary gland. Mammary growth, initiation/maintenance of lactation, milk synthesis, factors influencing lactation curve.

AnSc 3307. Artificial Insemination Techniques. (1 cr. S-N only. Prereq-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 3501. Principles of Farm Animal Environment. (3 cr. Prereq-Bio-2301, Jr or Sr)
Biological and physical processes involved in the adjustment of animals to ambient environments and their applications to farm animal management.

AnSc 3509. Animal Biotechnology. (3 cr. Prereq-Biol 1009 or equiv; # FoodBio 2011)
Scientific, social, and ethical issues related to current topics in animal biotechnology. Introduction to molecular genetics. Use of animals as biological reagents/tools, topics in reproductive biotechnology, methods for genetic modification of animals.

AnSc 3511. Animal Growth and Development. (3 cr.)
Basic principles of animal growth. Critical evaluation of interaction of nutrition, hormones, exercise, heredity, and disease in regulating growth.

AnSc 4011. Dairy Cattle Breeding. (3 cr. Prereq-3221)
Applying quantitative genetic principles to the breeding of dairy cattle. Primary emphasis on the evaluation of males, females, and systems of mating. Rates of genetic improvement with and without AI.

AnSc 4092. Special Problems in Animal Science. (1-4 cr. Prereq-#)
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. Prereq-#)
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. Prereq-#; 2-6 cr. Prereq-#; 4-6 cr. Prereq-COAFES undergrad; # complete internship contract available in COAFES Career Services before registering; UC 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 4102. Equine Management. (3 cr. Prereq-2102)
Fundamentals of horse management. Record keeping (traditional, computer based). Marketing, sales techniques. Legal aspects (e.g., contracts, zoning, liability, insurance). A management project involves establishing, maintaining, improving an equine business.

AnSc 4401. Swine Nutrition. (3 cr. Prereq-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. Prereq-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 4404. Applied Dairy Nutrition. (2 cr. Prereq-AnSc 4403 recommended)

AnSc 4405. Poultry Nutrition. (3 cr. Prereq-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 4601. Pork Production Systems Management. (4 cr. Prereq-3221, 3305, 4401; 4501 recommended)
Focus on understanding the inter-relationships of business, marketing, and biological performance of pigs in various types of production systems.

AnSc 4602. Sheep Production Systems Management. (4 cr. Prereq-3221, 3311 recommended)
Sheep management using breeding, selection, health, and physiological management aids for breeding flock and market production. Taught via ITV with Crookston campus and the West Central Experiment Station, Morris.

AnSc 4603. Beef Production Systems Management. (4 cr. Prereq-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, and marketing of feedlot cattle.

AnSc 4604. Dairy Production Systems Management. (4 cr. Prereq-3241, 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.

AnSc 4605. Poultry Production Systems Management. (4 cr. Prereq-2401, 4405 recommended)
Physiology, genetics, diseases, nutrition of poultry and relation to current management practices for production of eggs, broilers, and turkeys. Theoretical and practical phases of production and marketing in relation to their underlying principles. Visits to commercial production units.

For definitions of course numbers, symbols, and abbreviations, see page 300.
Course Descriptions


Anth 4111. Advanced Production Systems Management. [2 cr; Prereq: #4069; 4061] Analysis of pork production systems using case studies and visits to feed production facilities and modern swine production operations.


Anth 5099. Special Workshop in Animal Science. [1-6 cr [max 12 cr]; A-F only; Prereq - #] Topics vary. See Class Schedule or department. Topics may use guest lecturers/experts.

Anth 5200. Statistical Genetics and Genomics. [4 cr; Prereq - #Stat 3021 or equiv; Biol 4003 or equiv] Linkage analysis, variance data with codominant/ dominant markers, using allele transmission, maximum likelihood, and disequilibrium. Analysis for radiation hybrid mapping. Parentage testing, marker polymorphism. Experimental design and statistical analysis for mapping quantitative trait loci with additive, dominance, and epistasis effects. Candidate gene approach and genome scan. Marker assisted selection, genetic introgression.


Anthropology (Anth)

Department of Anthropology

College of Liberal Arts

Anth 1001. 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 1003W. Understanding Cultures. [4 cr] Introduction to social and cultural anthropology. Comparative study of societies and cultures around the world. Topics include adaptive strategies, economic processes; kinship, marriage, and gender; social stratification; politics and conflicts; religion and ritual; personality and culture.


Anth 1907W. Freshman Seminar. [3 cr [max 6 cr]; A-F only] Topics specified in Class Schedule.

Anth 1908W. Freshman Seminar. [3 cr [max 6 cr]; A-F only] Topics specified in Class Schedule.


Anth 1911W. Freshman Seminar. [3 cr [max 6 cr]; A-F only] Topics specified in Class Schedule.

Anth 3001. Introduction to 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 3002. Sex, Evolution, and Behavior: Examining Human Evolutionary Biology. [4 cr; A-F only] Methods/theories used to understand humans in an evolutionary framework. What can be known only, or primarily, form an evolved perspective. How evolutionary biology of humans might lead to better evolutionary theory. How physiology, development, behavior, and ecology coordinate/co-evolve in humans.

Anth 3003. Cultural Anthropology. [3 cr; Prereq - #1003 or 1005 or #] Areas of study may include: field research and politics of ethnographic Marxian/feminist theories of culture: culture, language, and discourse; psychological anthropology: culture/transnational processes.

Anth 3004. Great Controversies in Anthropology. [3 cr; A-F only] Notable controversies in anthropology: Is human “reason” the same in all cultures? What makes up evidence/truth when we study people? Whose “voices” should be heard? Should anthropologists support contemporary attempts at economic “development”? Is it possible to agree on a set of universal individual or cultural rights? Can we make qualitative judgments about cultures? What civic/political responsibilities does the anthropologist have at home and with the people whom she or he studies? In-class debates.

Anth 3005. Language and Sociocultural Analysis. [4 cr; Prereq - #1103 or 1005], anthropology major or #] Studying sociocultural forms by analyzing linguistic data obtained in fieldwork setting. Students work with fluent speaker of non-English language to explore an unfamiliar culture in manner of an ethnographer working with a key informant.

Anth 3007. Laboratory Techniques in Archaeology. [3 cr, Prereq - #1001, 3001] Focuses on plant remains, material culture, faunal remains, and human osteology. Emphasis on lab experience.

Anth 3008. Introduction to Flinthknapping. [3 cr; A-F only] Hands-on experience in replication of prehistoric stone tools, as basis for archaeological analysis and as art form in itself.

Anth 3009. Rise of Civilization. [3 cr] Concept of civilization, from early hunter gatherer groups through settled agricultural villages to rise of towns/cities, Comparisons processes of change in eight regions of the world.

Anth 3010. Native North Americans in Regional Perspective. [3-4 cr [max 6 cr]] An in-depth cultural and historical survey of native peoples who inhabited a particular region of North America (e.g., the greater southwest, prairie/woodland transition zone, Great Lakes area, Northwest coast, etc.).

Anth 3017. Peoples and Cultures of Middle America. [3 cr; Prereq - #1003 or 1005 or #] 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; Prereq - #1003 or 1005 or #] Hispanic cultures from Mexico to South America. Topics such as economy; underdevelopment; the family and ritual kinship, gender, religion, values, ideology, and change. Concepts are introduced to explore continuity/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; Prereq - #1003 or 1005 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. Relationship of societies to major issues in anthropological thought.


Anth 3029. Archaeology of Native Americans. [3 cr; Prereq - #1001] Pre-European contact and contact period archaeology of American Indians north of Mexico.


Anth 3040. The Anthropology of Africa. [3 cr] Explores daily life under socialism and the collapse of the political and economic systems, political organization, and the collapse of socialist rule in relation to key areas of social life such as gender, identity, nationalism, and ethnicity.
Anth 3035. Anthropologies of Death. (3 cr; A-F only. Prereq–1003 or 1005 or #) Anthropol ogy of death. Examines human approaches to death. Prereq–1003 or 1005 or #

Anth 3036. Introduction to Social Anthropology. (3 cr; A-F only. Prereq–1003 or 1005 or #) An introduction to social anthropology. Topics include religion and secularism, social change, and gender.

Anth 3041. Ecological Anthropology. (3 cr. §5041. Prereq–1003 or 1005 or #) Concepts, theories, and methods of ecological anthropology (cultural ecology). How humans interact with and biophysi cal environment. Topics include food production and consumption, economic organization, and the impact of colonization on gender. Prereq–1003 or 1005 or 3003 or #

Anth 3042. Contemporary Perspectives in Cultural Anthropology. (3 cr. §5042. Prereq–1003 or 1005 or #) Examines the impact of globalization on culture and the subjugation of nonwestern societies. Prereq–1003 or 1005 or 3003 or #

Anth 3043. American Indian Languages and Cultures. (3 cr. §301. Prereq–1003 or 1005 or 3003 or #) Survey of cultural developments among native peoples of North America from prehistoric times to the present.

Anth 3121. Globalization, Markets, and Inequality. (3 cr, A-F only. Prereq–1003 or 1005 or #) Globalization of American culture/business, uneven relationships between developed and developing economies, the laboratory of market forces, and the impact of globalization on gender. Prereq–1003 or 1005 or 3003 or #

Anth 3212. Globalization, Markets, and Inequality. (3 cr, A-F only. Prereq–1003 or 1005 or 3003 or #) Globalization of American culture/business, uneven relationships between developed and developing economies, the laboratory of market forces, and the impact of globalization on gender. Prereq–1003 or 1005 or 3003 or #

Anth 3301. Topics in Biological and Physical Anthropology. (3 cr. §5041. Prereq–1003 or 1005 or #) Topics may include faunal analysis, the human skeleton and osteology, primate and human evolution, and forensic anthropology. Topics vary according to student interest.

Anth 3313. Topics in Biological and Physical Anthropology. (3 cr. §5041. Prereq–1003 or 1005 or #) Topics may include faunal analysis, the human skeleton and osteology, primate and human evolution, and forensic anthropology. Topics vary according to student interest.

Anth 3913. Senior Project Planning. (1 cr. Prereq–1003 or #) Evaluation of work to date. Planning future course work and prospects for senior research project. Prereq–1003 or #

Anth 3916. Senior Project. (3 cr. Prereq–Sr major, #) Independent research project fulfilling the senior option; directed by a faculty member.

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

Anth 4019. Symbolic Anthropology. (3 cr. §8211. Prereq–1003 or 1005 or grad student) Pragmatic/structural aspects of social symbolism cross-culturally. Focuses on power, exchange, social boundaries, gender, and rituals of transition/reversal.

Anth 4021. Psychological Anthropology. (3 cr. §8209. Prereq–1003 or 1005, 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. A-F only. Prereq–Jr or Sr grad or #) 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. A-F only. Prereq–1003 or 1005) Five types of explanations employed in ethnographic research: diffusionism and theory of survivals; functionalist response; British structuralist; French structuralism; interpretive turn. Problems in ethnographic practice, analysis, and writing. Focuses on several classic monographic examples and associated theoretical writing.

Anth 4031. Applied Anthropology. (3 cr. Prereq–1003 or 1005 or 4003 or grad student or #) Practical application of theories/methods from social and cultural anthropology. Issues of policy, planning, implementation, and ethics as they relate to applied anthropology.

Anth 4035. Ethnographic Research Methods. (3 cr. Prereq–1003 or 1005 or grad student) History of and current issues in ethnographic research. Research projects, including participant observation, interviewing, research design, note taking, life history, and other ethnographic methods.

Anth 4043. Archaeology of Northern Europe. (3 cr) Archaeology of Scandinavia, British Isles, and northern parts of continental Europe, from late- Bronze Age through Viking Period. Themes include art and symbolism; growth of towns; social interactions; religion and ritual; introduction of Christianity; and development of long-distance trade.

Anth 4045. Gender and Power in South Asia. (3 cr) Analysis of the politics of gender in South Asia, especially India. Focuses 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. Prereq–1003 or 1005 or 3003 or #) Anthropological approaches to contemporary American society and culture. Tensions between market and family. Unity and diversity. Individualism and community.

Anth 4049. Religion and Culture. (3 cr. Prereq–1003 or 1005 or #) Religious beliefs and world views cross-culturally. Religious dimensions of human life through theories of origins, functions, and forms (e.g. myth, ritual, symbolism) of religion in society.

Anth 4051. Kinship, Gender, and Diversity. (3 cr. Prereq–1003 or 1005) 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. Economy, Culture, and Critique. (3 cr. §8205. Prereq–1003 or 1005 or 3003 or 4003 or grad student) Systems of production/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 market/nonmarket processes.

Anth 4057. Politics and Law. (3 cr. Prereq–1003 or 1005 or grad student) Problems of inequality, order and authority in nondynastic as well as state-based societies. Historical and cross-cultural survey of basic concepts through which these problems have been understood. Comparative political/legal systems, featuring case studies from Africa, Burma, New Guinea, Indonesia, and the United States.

Anth 4065. Cultural Change and Development. (3 cr. Prereq–1003 or 1005 or 4003 or #) Theories of change. Modernization, dependency, and world systems theories. Interdisciplinary analysis of case studies from Africa, Japan, Mexico, and Native North America. Impacts of global processes on local cultures.

Anth 4069. Environmental Archaeology. (3 cr. Prereq–1003, 3001 or grad) Use of remains from archaeological sites and off-site records of ancient landscapes, vegetation, and climate to reconstruct how humans interacted with their environments. Interdisciplinary approaches toward reconstructing past human environments; long-term local and global environmental change.

Anth 4071. Race and Culture. (3 cr. A-F only. Prereq–1003 or 1005 or 3003 or #) Evaluation of main trends in study of racism. Psychological, sociological, symbolic, and “critical” approaches that treat racism as a sociodiscursive phenomenon. Racist discourse as a practice that defines an “other” and subjugates that other to strategies of exclusion.

Anth 4075. Cultural Histories of Healing. (3 cr. A-F only. Prereq–1003 or 1005 or #) Introduction to historically informed anthropology of healing practice. Shift to biologically based medicine in Europe, colonialist dissemination of biomedicine, and the “ethnomedicines,” traffic of healing practices in a transnationalist world.

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

Anth 4990. Topics in Anthropology. Seminar. (3-6 cr [max 6 cr]. Prereq–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]. Prereq–#) 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]. Prereq–#) 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]. Prereq–#) 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]. Prereq–#) Qualified students may conduct a well-defined research project under the guidance of a faculty member.

Anth 5008. Advanced Flintknapping. (3 cr; A-F only. Prereq–3008 or 5269 or #) Hands-on training in techniques of advanced stone tool production, artifact reproduction, and lithic experimental design for academic/artistic purposes.

For definitions of course numbers, symbols, and abbreviations, see page 300.
### Applied Economics (ApEc)

**Department of Applied Economics**

**College of Agricultural, Food, and Environmental Sciences**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ApEc 1001</td>
<td>Orientation to Applied Economics</td>
<td>1 cr.</td>
<td>A-F only</td>
</tr>
<tr>
<td>ApEc 1101</td>
<td>Principles of Microeconomics</td>
<td>3 cr.</td>
<td>[max 3 cr.]</td>
</tr>
<tr>
<td>ApEc 1251</td>
<td>Principles of Macroeconomics</td>
<td>3 cr.</td>
<td>[max 3 cr.]</td>
</tr>
<tr>
<td>ApEc 3091</td>
<td>Economic Development of U.S. Agriculture</td>
<td>3 cr.</td>
<td>Prereq–[1101 or Econ 1101], [1130 or Econ 1230]</td>
</tr>
<tr>
<td>ApEc 3111</td>
<td>Agricultural and Economic Growth in Developing Countries.</td>
<td>3 cr.</td>
<td>Prereq–[1101, 1102, Econ 1101, 1102] or #)</td>
</tr>
<tr>
<td>ApEc 3411</td>
<td>Commodity Marketing</td>
<td>3 cr.</td>
<td>Prereq–[1101 or Econ 1101]</td>
</tr>
<tr>
<td>ApEc 3451</td>
<td>Food and Agricultural Sales</td>
<td>3 cr.</td>
<td>Prereq–[1101 or Econ 1101]</td>
</tr>
<tr>
<td>ApEc 3821</td>
<td>Retail Center Management</td>
<td>3 cr.</td>
<td>Prereq–[1101 or Econ 1101]</td>
</tr>
<tr>
<td>ApEc 3881</td>
<td>Principles of Farm Management</td>
<td>3 cr.</td>
<td>Prereq–[1101 or Econ 1101]</td>
</tr>
<tr>
<td>ApEc 3991</td>
<td>Independent Study in Applied Economics</td>
<td>1 cr.</td>
<td>Prereq–#)</td>
</tr>
<tr>
<td>ApEc 4006</td>
<td>Professional Experience Program</td>
<td>3 cr.</td>
<td>Prereq–COAFES jr or sr, #)</td>
</tr>
</tbody>
</table>

**Course Descriptions**

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

**Anth 5027W. Origins of European Civilization.** (3 cr; §3027) 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; 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; Prereq-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, §3041, §8213, Prereq-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 cross-culturally.

**Anth 5043. Colonialism and Culture.** (3 cr; A-F only) Making of culture as colonial/anthropological object of knowledge. Relationship between colonial knowledge/formation of academic disciplines (especially anthropology). Colonial/postcolonial transformations of colony, nation, and metropole.

**Anth 5045. Urban Anthropology.** (3 cr; Prereq-4003 or grad or #) Anthropological approaches to urban life in Western and non-Western settings. Topics include social networks and voluntary organizations; class, ethnicity, gender and power; migration and immigration; urban labor and economics; and urban “problems.”

**Anth 5221. Anthropology of Material Culture.** (3 cr; A-F only) Material culture as a social creation, studied from multiple perspectives (e.g., social anthropology, archaeology, primatology). Conceptions of how humans articulate with material world they construct.


**Anth 5269. Analysis of Stone Tool Technology.** (4 cr; A-F) Prereq–1001 or 3001 or #) Praclical lab experience. How to analyze archaeological collections of stone tools to learn about human technological behavior in past. Students analyze archaeological/experimental collections, make stone tools themselves.

**Anth 5980. Topics in Anthropology.** (3 cr; [max 3 cr]) Topics specified in Class Schedule.

**Anth 5990. Topics in Archaeology.** (3 cr; [max 9 cr]; A-F only; Prereq–#) Topics specified in Class Schedule.
APEC 4103. World Food Problems. (3 cr. #Agr 4103, #CAPS 4101, #SCaN 4103. Prereq-Jr or Sr or grad) A multi-disciplinary look at problems and possible solutions affecting food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views on population, technology, and ethical and cultural values of people from parts of the world.

APEC 4111. Tourism Development: Principles, Processes, Policies. (3 cr. Prereq-1101, 1102 or Econ 1101, 1102) Evolution of tourism industry; economic, environmental, and sociocultural impacts of tourism development and government policies and organizations; models and tools needed for successful development; consequences of development activities and ways to involve stakeholders in decisions.

APEC 4451W. Food Marketing Economics. (3 cr. Prereq-1101 or Econ 1101; 60 cr) Economics of food marketing in the United States. Food consumption trends, consumer food behavior, marketing strategies, consumer survey methodology, food distribution/retailing system. Policy issues related to food marketing. Individual/group projects.

APEC 4481. Futures and Options Markets. (3 cr. §5481. Prereq-1101 or Econ 1101) [Anv 2211 or OMS 1520 or Stat 3011; 60 cr or #] Economics of futures/options trading in theory/ application. Basis/price relationship in storable/nonstorable/commodity/competitive future of options. Speculation. Pricing efficiency. Market performances/ regulation.


APEC 4611. Resource Development and Environmental Economics. (3 cr. §Econ 3611. Prereq-1101 or Econ 1101; [1102 or Econ 1102; 60 cr or #]) Basic concepts of resource use. Economic/environmental feasibility. External effects, market failures. Resource use, environmental problems. Measuring impacts of resource development. Economics of alternative resource programs, environmental strategies.


APEC 5032. Economic Data Analysis for Managerial and Policy Decisions. (3 cr. Prereq-5031 or #) familiarity with SAS Statistical/econometric methods for the analysis of large data sets to support managerial/policy decisions. Methods for organizing, accessing, and ensuring the quality of data. Estimation techniques include panel data methods, limited dependent variable models, and time series analysis. Emphasizes clarity of reporting and design of procedures for maintaining/updating data estimates.

APEC 5151. Applied Microeconomics: Firm and Household. (3 cr. Prereq-3001 or Math 1271 or Math 2243 or equiv or grad student or #) Quantitative techniques for analysis of economic problems of firms and households. Links between quantitative tools and economic analysis Regression analysis, mathematical programming, and present value analysis.

APEC 5152. Applied Macroeconomics: Income and Employment. (3 cr. Prereq-3001 or Math 1271 or Math 2243 or equiv or grad student or #) Static general equilibrium open economy models and simple business cycle models that examine economic growth, business cycles, and fiscal and monetary policy. Input-output analysis and large scale econometric models. Sources/properties of economy and sector-wide data. Empirical applications.

APEC 5321. Regional Economic Analysis. (3 cr. Prereq-3006 or Econ 3120 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. Public Finance. (3 cr; A-F only. Prereq-3001 or Econ 3101 or PA 5021) Which services should the public sector provide? Which level of government should provide them? How should governments fund those services? Which types of taxes should be levied and on whom? Applying economic theory/analysis to spending, revenue, and tax policy issues facing governments.


APEC 5511. Labor Economics. (3 cr. §Econ 5511. Prereq-5011 or Econ 5011 or PA 5021) (PA 5022 or equiv, grad student or #) Theoretical foundations of labor markets. Intertemporal/household labor supply. Demand for labor, efficiency wages. 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 5581. Human Capital and Household Economics. (3 cr. Prereq-3001 or Econ 3101 or #) Households and economic 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. Economic Aspects of Environmental Management. (3 cr; A-F only. Prereq-[Sr or grad student] in [biological science or conservation biology or ecology or fisheries or forestry or public affairs or water resources or wildlife conservation] or CLA or #) The economist approach to environmental problems such as water/air pollution. Application of supply/demand concepts to evaluation of environmental resources. Methods of evaluation. Analysis of pollution control policies from economic point of view.

APEC 5651. Economics of Natural Resource and Environmental Policy. (3 cr. Prereq-[3001 or Econ 3011, 4611 or Econ 3611 or NRES 3261W] or #) Economic analyses, including project evaluation of current natural resource issues. Emphasizes intertemporal use of natural resources, natural resource scarcity/adequacy, environmental quality, and mechanisms for pollution control and their implications for public policy.

APEC 5711. U.S. Agricultural and Environmental Policy. (3 cr. Prereq-3001 or Econ 3101) U.S. agricultural policy in an open world economy: role of private markets and government in regulating supply and demand; income vs. price support, supply controls, environmental constraints, and export protectionism; functioning of markets; roles of public interest groups and future of American agricultural policy.

APEC 5721. Economics of Science and Technology Policy. (3 cr. Prereq-[IS 5151 or IS 5151S, PA 5022] or #) Economics of technical change, research, and technology. Productivity. Methods for evaluating impacts of R&D. Intellectual property rights.

APEC 5731. Economic Growth and International Development. (3 cr. Prereq-3002 or [Econ 3101, Stat 3022; Econ 4211 recommended]) Economics of research/development. Technical change, productivity growth, Impact technology on institutions. Science/technology policy.


APEC 5811. Cooperative Organization. (3 cr. Prereq-3001, 5022 or #) Application of economic analysis to the cooperative form of organization. Producer and consumer cooperatives used to examine economic issues such as changing market organization, financing, management incentives, taxation, and antitrust regulations. Cooperatives as a tool for economic development included.

APEC 5891. Independent Study: Advanced Topics in Farm and Agribusiness Management. (1-4 cr. Prereq-#) Special topics or individual work suited to the needs of particular groups of students.

APEC 5991. Special Topics and Independent Study in Applied Economics. (1-4 cr. Max 12 cr. Prereq-#) Special classes, independent study, and supervised reading and research on subjects and problems not covered in regularly offered courses.

Arabic (Arab)

Department of African American and African Studies

College of Liberal Arts

Arab 1101. Beginning Arabic. (5 cr) Oral practice, reading, comprehension, basic grammar. For students with no previous training in Arabic.

Arab 1102. Beginning Arabic. (5 cr. Prereq-1101 or equiv or #) Comprehension, oral practice, and reading of standard Arabic. Continuation of 1101.


Arab 3036. Islam: Religion and Culture. (3 cr. #Afr 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. (5 cr. Prereq-1102 or equiv or #) Advanced grammar and conversational practice. Reading Arabic texts.

Arab 3102. Intermediate Arabic II. (5 cr. Prereq-3101 or #) Advanced grammar, analyses of readings, oral comprehension.
Arab 3491. Classical Islamic Civilization. (3 cr. §Afro 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. §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 Abdul-Hayy, Abul-al-Sabur, Mahfouz, El-Sa’dawi, 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 3542. Medieval Islam. (3 cr. §Arab 5542) Islamic dynasties, Mamluks and Mongols, and Crusaders and Assassins. Abbasid Caliphate’s disintegration and rise of Seljuk Turks.

Arab 3543. Arabs Under Mamluks and Ottomans: 1300-1920. (3 cr. §Arab 5543) Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt; dynamic 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. Prereq-#) 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 5036. Islam: Religion and Culture. (3 cr §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, Americas.

Arab 5101. Advanced Arabic I. (2-3 cr. Prereq-3102 or equiv or #) Advanced readings in classical and modern Arabic.

Arab 5102. Advanced Arabic II. (3 cr. Prereq-5101 or #) Readings of Arabic texts. Writing compositions based on texts. Continuation of 5101.

Arab 5491. Classical Islamic Civilization. (3 cr. §Afro 5036) Islamic legacy in the classical age (800-1400), including medical and natural sciences, mathematics, philosophy, literature, and their transmission to Europe.


Arab 5503. Arab 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 §3505, §Hist 3505, §MELC 3505) Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present.


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

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

Arab 5544. Arab World: 1920 to the Present. (3 cr §3544) 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 5900. Topics In Arabic Literature and Culture. (3 cr [max 9 cr] §Prereq-5102 or #) Readings and discussion of selected works in Arabic. Topics specified in Class Schedule.

Arab 5992. Directed Readings. (1-3 cr. Prereq-#) Individual research and readings for advanced students.


Arch 4572. Structural Frames and Building Design/Construction. (3 cr; A-F only) Basic contemporary structural systems in masonry, steel, and wood framing systems. Forms/performance of systems.

Arch 5123. Architectural Thesis. (6 cr; A-F only. Prereq-5122, 5241, BA Arch major; students must submit thesis plan in semester before writing thesis) 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; A-F only. Prereq-For undergrads 5122, BA Arch major; for grads 5255, M Arch major or #) 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 5250. Advanced Topics in Design. (1-6 cr [max 6 cr]; A-F only. Prereq-Arch or #) Advanced topics in design.

Arch 5281. Undergraduate Architecture Studio I. (6 cr; A-F only. Prereq-# or a) 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; A-F only. Prereq-# or a) Exploration of human response to the natural 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; A-F only. Prereq-# or a) Exploration of selected design issue or topic, its influence on organization of material form to create places of human habitation.

Arch 5284. Undergraduate Architecture Studio IV. (4 cr; A-F only. Prereq-# or a) Design studio.

Arch 5291. Accelerated Undergraduate Architecture Studio I. (6 cr; A-F only. Prereq-#) Selected architectural problems developed by faculty to deepen/enrich ideas introduced in required architectural studio sequence.

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

Arch 5311. Theory of Architectural Representation. (3 cr; A-F only. Prereq-[5371, 5372, M Arch or |] Integration and emerging computer graphics with photography and architectural graphic conventions. Historical, theoretical, and critical issues of representation. Influence of visual media on architectural field.

Arch 5313. Visual Communication Techniques in Architecture. (3 cr; A-F only. Prereq-For undergrads 3301, BA Arch or BED major; for grads M Arch major or #) Exploration of delineation, presentation, and design techniques, using various visual media and methods of observation of projects.

Arch 5321. Architecture in Watercolor. (3 cr; A-F only. Prereq-[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]; A-F only. Prereq-[5321, Arch major or M Arch major] or #) Selected topics in architectural representation.

Arch 5351. AutoCAD I. (3 cr; A-F only. Prereq-For undergrads 5281, Arch major; for grads M Arch major or #) 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 drafting capabilities. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5352. AutoCAD II. (3 cr; A-F only. Prereq-For undergrads 5351, Arch major; for grads M Arch major or #) 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 drawing suitable for plotting. Use of dimension variables, attributes, blocks, symbols, and the creation of customized menus.

Arch 5353. Topics in Architectural Representation: 3-D Architectural Modeling and Design. (3 cr; A-F only. Prereq-For undergrads 5281 or 5351, Arch major; for grads M Arch major or #) Introduction to 3-D studio for architectural modeling, rendering, and animation. Video recording and editing.

Arch 5371. Computer Methods I. (1 cr; S-N only. Prereq-6251, M Arch major or #) Introduction to current techniques, computer programs, and their application to architectural computing.

Arch 5372. Computer Methods II. (1 cr. Prereq-5371, S 6252 and M Arch major or #) Current techniques, computer programs, and their application to architectural computing and design.

Arch 5373. Computer Methods III. (1 cr. S-N only. Prereq-5372, S 6254, M Arch major or #) Advanced techniques, computer programs, and their application to architectural computing in design, theory, and technology.

Arch 5374. Computer Methods IV. (1 cr. Prereq-5373, S 6254, 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; A-F only. Prereq-Arch or BED or M Arch or grad student in LA or #) 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. (3 cr [max 12 cr]; A-F only. Prereq-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; A-F only. Prereq-M Arch major or #) 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; A-F only. Prereq-For undergrads 3411, Arch major; for grads M Arch major or #) History of development of architecture and urban design in Western Europe from 1150 to 1400.

Arch 5424. Renaissance Architecture. (3 cr; A-F only. Prereq-For undergrads 3411, Arch major; for grads M Arch major or #) 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; A-F only. Prereq-For undergrads 3411, Arch major; for grads M Arch major or #) 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. Prereq-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 5431W. Eighteenth-Century Architecture and the Enlightenment. (3 cr; A-F only. Prereq-[3411, 3412, undergrad Arch major or M Arch grad student or #) Architecture, urban planning, and garden design in Europe from 1700 to 1850.

Arch 5432. Modern Architecture. (3 cr; A-F only. Prereq-For undergrads 3412, 3414, Arch major; for grads M Arch major or #) 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; A-F only. Prereq-For undergrads 3412, 3414, Arch major; for grads M Arch major or #) 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; A-F only. Prereq-For undergrads 3412, 3414, Arch major; for grads M Arch major or #) History of architectural theory from antiquity to the 20th century.

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

Arch 5451. Architecture: Defining the Discipline. (3 cr; A-F only. Prereq-M Arch major or #) Architecture as a discipline: its nature, role, purpose, and meaning discussed within a general, philosophical, and theoretical framework. Investigation and discussion of paradigms defining architectural theory and practice.
**Course Descriptions**

**Arch 5452. Architecture: Design, Form, Order, and Meaning.** (3 cr; A-F only. PreReq-M Arch major or #) Architecture and the issue of meaning. Examines fundamental and constituent elements of architectural form and order; their inherent tectonic, phenomenal, experiential, and symbolic characteristics; their potential and implications for the creation and structure of meaningful human places.

**Arch 5454. Semiotics and Deconstruction in Architecture.** (3 cr; A-F only. PreReq-5411, M Arch major or #) Expressive and cultural dimensions of architecture, especially those related to linguistic analogies, knowledge production, and contemporary philosophical. Broad critical perspective of architectural discussion and argumentation addressing current issues.

**Arch 5455. Typology and Architecture: Theories of Analysis and Synthesis.** (3 cr; A-F only. PreReq-5411, M Arch major or #) 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; A-F only. PreReq-3412, Arch major or grad student or #) Architecture as a cultural medium. Relationships among architecture, people, and culture; research findings and design; vernacular and high style architecture. Physiological and symbolic messages; recognition of aesthetic structure; cultural critique and change; implications for architectural practice.

**Arch 5459. Gender and Architecture.** (3 cr; PreReq-Arch or WS65 or M Arch major or #) Examination of ideas related to gender and architecture, gendered and non-gendered places and practices, and their relations to social roles and change.

**Arch 5461. North American Indian Architecture.** (3 cr. PreReq-for undergrads 5412, Arch or Art in major; for grad 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. Architecture and Ecology.** (4 cr; A-F only. PreReq-2581, LA 3501, Arch major or #) Introduction to ecological approaches to architectural design. Ecological context, implications/opportunities of architecture. Historical/theoretical framework for ecological design thinking. Issues studied at a variety of scales: site/community, building scale, component scale. Fundamental theories, concepts, principles, strategies, and design tools addressed at each scale.

**Arch 5511. Construction Materials in Architecture.** (3 cr; A-F only. PreReq-M Arch or #) Building materials, assemblies, and construction operations shaping building designs. Material properties for design/detailing of building systems, elements, and components. Implications in design applications. Modeling, hands-on building experiences.

**Arch 5512. Building Methods in Architecture.** (3 cr; A-F only. PreReq-5511, M Arch major or #) Analysis of architectural materials, building systems, and construction operations related to enclosure systems. Design, construction, 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; A-F only. PreReq-M Arch major or #) 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; A-F only. PreReq-M Arch major or #) 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; A-F only. PreReq-5512, M Arch major or #) Design principles, construction methods, and document production for masonry structures.

**Arch 5539. Daylighting and Architecture Design.** (3 cr; A-F only. PreReq-5511, M Arch major or #) 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; A-F only) Functions of building mechanical systems and their integration with other building components. Residential/commercial HVAC systems, alternative energy sources, energy efficiency, structural implications of building energy, indoor air quality, environmental control strategies. Case studies.

**Arch 5550. Topics in Technology.** (1-3 cr [max 6 cr]. PreReq-#) Selected topics in architecture technology, including construction, environmental management, energy performance, lighting, or materials.

**Arch 5561. Building Production Processes.** (3 cr. PreReq-5282, 5501, Arch major or BEd major or M Arch major or #) 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 5572. Architectural Structures II: Concrete and Masonry Design.** (3 cr; A-F only. PreReq-5571, M Arch major or #) 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; A-F only. PreReq-Grad student or upper level undergrad student) 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; A-F only. PreReq-M Arch major or #) 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; A-F only. PreReq-M Arch major or #) Legal subject matter relevant to the work of architects and design professionals.

**Arch 5645. Real Estate Development in Architecture.** (3 cr; PreReq-For undergrads BA Arch major; for grads 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.** (1-4 cr. PreReq-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. PreReq- 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. PreReq-3412 or #) Philosophy, theory, and origins of historic preservation. Historic architecture 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 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. PreReq-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. PreReq-3412, 5672 or #) Philosophy, theory, and methods of historic building research, descriptive analysis, and documentation, building documentation, historical archaeology, and architectural taxonomy.

**Arch 5711. Design Principles of the Urban Landscape.** (3 cr; A-F only. PreReq-Arch or BEd major or M Arch or LA grad major or #) 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 5721. Proseminar in Metropolitan Design.** (3 cr; A-F only. PreReq-[5711 or equiv], enrollment in CMD prog) or #) Reading seminar. Evolution of the contemporary city. Dynamics that created contemporary urban spatial patterns. Planning/design theories that have guided this transformation and on-going 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 5742. Meanings of Places.** (3 cr; A-F only. PreReq-Arch or BEd major or M Arch or LA grad major or #) 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; A-F only. PreReq-5711, M Arch or LA grad major or #) Special topics in theory and practice of urban design.

**Arch 5790. Directed Study.** (1-4 cr; A-F only. PreReq-#) Guided individual reading or study.
Art (ArtS)  
Department of Art  
College of Liberal Arts  
Concepts of visual art-making in contemporary/historical contexts. The media, environment, concerns of the practicing artist. Creative process, visual expression, criteria. Aesthetic foundation for beginning studio courses.  
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. Prereq–1101 or #)  
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 1501. Printmaking. (4 cr)  
Introduction to techniques of printmaking: woodcut, etching, lithography, and screen printing. Historical approaches and use through contemporary materials and concepts. Emphasis on the interrelationship of process, materials, and ideas.  
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.  
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 1902. Freshman Seminar. (3 cr [max 6 cr]; A-F only)  
Topics specified in Class Schedule.  
ArtS 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only)  
Topics specified in Class Schedule.  
ArtS 1910W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq–1001, 1101)  
Topics specified in Class Schedule.  
ArtS 3106. Drawing: Interpreting the Site. (4 cr. Prereq–1001, 1101)  
Field trips to draw or paint in various metropolitan area locations. Site investigations, experimentation with marks/symbols. Focuses on search for personal content as inspired by site.  
ArtS 3111. Life Drawing I. (4 cr. Prereq–1001, 1101)  
Focus on the human form with an introduction to anatomy. Exploration of various concepts of representation and methods of image construction. Work from life, anatomical casts, memory and imagination.  
ArtS 3112. Life Drawing II. (4 cr. Prereq–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 3301. Sculpture: Direct Metal. (4 cr. Prereq–1001, 1301)  
Constructive approach to sculpture through welding in steel, other metals. Studio practice; investigation of historical/contemporary methods/concepts.  
Focuses on sculptural practice outside traditional media/approaches. Theoretical constructions of space as primary medium of sculpture. Installation, theater, public art, architecture.  
ArtS 3303. Sculpture: Metalcasting. (4 cr. Prereq–1001, 1301)  
Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts.  
ArtS 3304. Sculpture: Carving and Construction. (4 cr. Prereq–1001, 1301)  
Carving/construction using wood, other materials. Studio practice, investigation of historical/contemporary methods/concepts.  
The exploration of movement in sculpture (wind, water, electric). Studio practice and investigation of historical and contemporary methods and concepts.  
ArtS 3306. Performance Art and Installation. (4 cr. Prereq–1001, 1301)  
Studio practice, investigation of forms of expression involving narrative, performance, installation. Hybrid art forms introduced by Dada movement in 1920’s, continued by Fluxus movement in 1950’s, to contemporary performance/installation art.  
ArtS 3307. Sculpture: Traditional Approaches. (4 cr. Prereq–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. Prereq–1001, jr or #)  
Primary critical 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. Prereq–1001, one visual art course)  
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. Prereq–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]; A-F only. Prereq–Honors, #)  
Individual consultation with a faculty member on visual work, research project, presentation, paper, or bibliography.  
ArtS 3415H. Honors Exhibition. (2 cr; A-F only. Prereq–Magna or Summa Honors candidate, #)  
Advanced problems in studio and research, leading to a magna or summa exhibition.  
ArtS 3416H. Honors Thesis. (1-4 cr. A-F only. Prereq–Summa level honors candidate, #)  
Summa thesis paper written in support of honors exhibition or in relation to candidate’s visual/conceptual interests.  
ArtS 3444. Major Project. (1 cr; S-N only. Prereq–#)  
Individually designed independent project or exhibition.  
ArtS 3496. Internship in the Arts. (1-3 cr; S-N only)  
Prereq–BFA Art major, #  
Field work at local, regional, national, or international arts organization or with professional artist provides experience in activities/administration of art/art-based organizations.  
ArtS 3499. Internship at Katherine E Nash Gallery. (3 cr; S-N only. Prereq–1001, #)  
Hands-on experience in day-to-day operation/mission of Department of Art’s professional gallery.  
In-depth investigation of intaglio/screenprinting. Application of traditional/contemporary techniques. Emphasizes individual artistic expression. Review of historical/cultural development of the media.  
ArtS 3502. Printmaking: Relief and Lithography. (4 cr. Prereq–1001, 1501)  
Expressive/formal aesthetics of woodcut relief, hand lithography. Studio practice/investigation of artistic attitudes as exemplified through historical perspectives, traditional/contemporary usages.  
ArtS 3505. Papermaking as an Art Form. (4 cr. Prereq–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.  
Conceptual/aesthetic development of digital/interactive works of art. How Web/screen based applications expand formal/conceptual issues of virtuality, community, agency, and non-linear structure within fine art. Critical theory. History of new media/technologies that can enable individual expression.  
ArtS 3602. Time Arts: Video. (4 cr. Prereq–1001, 1601)  
Digital/non-linear video processes to explore elements of time, cinematic space, narrative, and montage. Personal aesthetic/conceptual directions. Theory, critical readings about historical/contemporary works in digital media.  
ArtS 3603. Time Arts: 2-D Animation. (4 cr. Prereq–1001, 1601)  
Experimentation and creating a personal voice with two-dimensional animation. Historical overview and contemporary issues. Creating 2-D animation with digital technologies focusing on vector and layer-based raster animation.  
ArtS 3604. Time Arts: 3-D Animation. (4 cr. Prereq–1001, 1601)  
Conveying creative ideas visually with three-dimensional animation. Creating virtual objects in virtual spaces moving in time. Modeling objects and spaces, creating textures, lighting, movement, and animating to a sound track.  
Classical photographic practice, concentrating on camera/darkroom controls. Historical overview of the medium. Conceptual/contemporary approaches to traditional themes.
Course Descriptions


ArtS 5403. Women's Images and Images of Women. (3 cr. Prereq–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 5441. Professional Practices. (3 cr. Prereq–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 5444. Bachelor of Fine Arts Exhibition. (1 cr.; S-N only. Prereq–BFA candidate, sr. #) Final solo or small group exhibition and artist’s statement developed in consultation with faculty advisor. Visual documentation of work and statement as appropriate to the project.

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


ArtS 5545. Advanced Drawing: Interpreting the Site. (4 cr. Prereq–3306 or #) Studio practice in kinetic sculpture. Historical/contemporary methods/concepts of sculpture developed in consultation with instructor.


ArtS 5550. Advanced Papermaking. (4 cr [max 12 cr]. Prereq–3505 or #) Distinct expressive qualities of handmade paper, its versatility as contemporary art form. Independent research pursued in consultation with instructor.


ArtS 5620. Time Arts: Advanced Video. (4 cr [max 12 cr]. Prereq–3602) Individual projects exploring elements of time, cinematic space, narrative, and montage through experimental, documentary, or installation-based video art. Articulation of relationships between conceptual, aesthetic, and artistic process.

ArtS 5630. Time Arts: Advanced 2-D Animation. (4 cr [max 12 cr]. Prereq–3603 or #) Individual projects and further development of a personal voice and critical thinking in time-based art. Creating digital 2-D animation with emphasis on vector and layer-based raster animation techniques. Compositing 2-D animation with video.

ArtS 5640. Time Arts: Advanced 3-D Animation. (4 cr [max 12 cr]. Prereq–3604 or #) Advanced exploration of modeled objects in modeled space and time. Compositing of animated images with video images. Individual projects, expansion of personal voice and visual clarity within the framework of 3-D imagery and time-based artwork.


ArtS 5990. Independent Study in Art. (1-4 cr [max 12 cr]. Prereq–Major, #) Independent study project designed by student in consultation with instructor.
Art History (Arth)

Department of Art History
College of Liberal Arts

ArtH 1001. Introduction to Art History. (3 cr)
History of art examined through selected monuments of major periods, from Paleolithic to modern times. Covers Western, Eastern, and South Asian art. (4 cr)
ArtH 1002W. Why Art Matters. (4 cr)
Introduction to history of topics that investigate power/importance of art both globally and in its diverse forms, from architecture and painting to video and prints. Sacred space, propaganda, the museum, art/fraud, art/authority, tourism. (4 cr)
ArtH 1004W. Introduction to Asian Art. (4 cr) §1004V, §1016W, §1016V
Issues/themes of South Asian, Southeast Asian, and East Asian art from earliest times to present. (4 cr)

ArtH 1909W. Topics: Freshman Seminar. (3 cr; A-F only. Prereq- Fr or no more than 36 cr)
Topics specified on One Stop Course Guide. (4 cr)
ArtH 1910W. Topics: Freshman Seminar. (3 cr)
Topics specified on One Stop Course Guide. (4 cr)

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

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. (4 cr)

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. (4 cr)

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. Serin, Toulouse; Cathedral of Chartres, Paris, Rheims). (4 cr)

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). (4 cr)

ArtH 3012. History of 19th- and 20th-Century Art. (3 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. (4 cr)

ArtH 3013. Introduction to East Asian Art. (3 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. (4 cr)

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

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. (4 cr)

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

ArtH 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. (4 cr)

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. (4 cr)

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. (4 cr)

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. (4 cr)

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. (4 cr)

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

ArtH 3340. Practicum in Archaeological Field and Computer Techniques. (3 cr; Prereq- One course in ancient art/archaeology or ArtH 3371)
Methods for excavation of Old/New World sites. Meets at archaeometer/computer lab for part of semester and at selected site in Minnesota for day-long sessions for 9 to 10 weeks. (4 cr)

ArtH 3401. Art Now. (3 cr; A-F only)
Analysis of visual representations in fine arts and popular media, in context of social issues. Obscenity, censorship, democracy, technology, commerce, the museum, propaganda, social role of artist. Understanding the contemporary world through analysis of dominant aesthetic values. (4 cr)

ArtH 3422. History of Graphic Arts: 1780 to 1980. (4 cr)
History and theory of the creation of lithography, softcaricature (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. (4 cr)

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. (4 cr)

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 according to place/time. Students prepare/critique personal themes. (4 cr)

ArtH 3575. The Art of Walt Disney in American Culture. (4 cr)
Works of Walt Disney in all media. Blue, Rose, Cubist, Classical, and nonmajors. Must consult with director of undergraduate studies. (4 cr)

ArtH 3585. African American Art. (3 cr; A-F only)
Four hundred year history of African American art. How/why African Americans created artwork at specific times, in specific places. Arts of African Americans within their own communities, National arts movements, and American life during historical junctures. (4 cr)

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. (4 cr)

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. (4 cr)

ArtH 3927. 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). (4 cr)

ArtH 3930. Junor-Senior Seminar. (3 cr; A-F only. Prereq- [jr or sr] ArtH major)
Major art-historical theme, artist, period, or genre. Topics specified in Class Schedule. (4 cr)

ArtH 3930H. Honors: Junor-Senior Seminar. (3 cr; A-F only. Prereq-Honors [jr or sr] ArtH major)
Major art-historical theme, artist, period, or genre. Topics specified in Class Schedule. (4 cr)

ArtH 3940. Topics in Art History. (1-4 cr [max 12 cr])
Topics specified in Class Schedule. (4 cr)

ArtH 3971W. Major Project. (1 cr; A-F only. Prereq-Honors ArtH major)
Completion of research paper begun in a 5xxx course. (4 cr)

ArtH 3971W. Major Project. (1 cr; A-F only. Prereq-ArtH major)
Completion of research paper begun in a 5xxx course. (4 cr)

ArtH 3975. Directed Museum Experience. (1-2 cr; S-N only. Prereq- [jr or sr] ArtH major)
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. (4 cr)

ArtH 3993. Directed Study. (1-4 cr; max 12 cr; A-F only. Prereq- [jr or sr] ArtH major)
Completion of research paper begun in a 5xxx course. (4 cr)

ArtH 3994. Directed Research. (1-4 cr; max 12 cr; A-F only. Prereq- [jr or sr] ArtH major)
Completion of research paper begun in a 5xxx course. (4 cr)

ArtH 5101. Myths in Art: Cross-Cultural Comparison. (3 cr; A-F only)
Relationships of text/image, efficacy of each in conveying meaning. Properties of visual/verbal communication. Ways in which artists convey mythological meanings, how much these ways differ according to place/time. Students prepare/critique visual presentations through Web pages. (4 cr)

ArtH 5103. Hellenistic and Early Roman Art and Archaeology. (3 cr. Prereq-Class/ArtH 3008, jr or sr)
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. (4 cr)

ArtH 5108. Greek Architecture. (3 cr. Prereq-ArtHClass 3008, jr or sr or grad, or grad)
Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor, and Italy. (4 cr)

ArtH 5111. Prehistoric Art and Archaeology of Greece. (3 cr. Prereq- jr or sr or grad student, Greek art/ archaeology course or Jr)
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. (4 cr)

For definitions of course numbers, symbols, and abbreviations, see page 300.
Course Descriptions

Arth 5120. Field Research in Archaeology. (3-6 cr [max 6 cr]. Prereq–#) Field excavation, survey, and research at archaeological sites in the Mediterranean area. Techniques of excavation and exploration; interpretation of archaeological materials.

Arth 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr. Prereq–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. Prereq–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 capabilities to adjust to the demands of a Christian Empire.

Arth 5234. Gothic Sculpture. (3 cr. Prereq–jr or sr or grad or #) The origin, character, and development of Gothic sculpture in France, the German empire, and the Netherlands, 1150-1400. 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 5252. History of Early Christian Art in Context. (3-4 cr. Prereq–2xxx Arth 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 5301. The Visual Culture of the Atlantic World. (3 cr; A-F only. Prereq–Grad student or #) Visual culture of Atlantic world, from Columbus to American Revolution. Visual objects, practices considered in context of Europe’s colonization of the Americas. Slavery, religious conflict, international commerce, and production of scientific knowledge addressed in terms of their impact upon visual imagery.

Arth 5302. Print Culture in Early Modern Europe. (3 cr; A-F only) Cultural history of printed images in Europe from their emergence in 15th century through about 1750. Book illustration, reproductive printmaking. History of print connoisseurship. Prints and scientific knowledge. Role of print culture in major social/political events such as Protestant Reformation.

Arth 5324. 15th-Century Painting in Northern Europe. (3 cr. Prereq–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 influences.

Arth 5340. Practicum in Archaeological Field and Computer Techniques. (3 cr. Prereq–One course in ancient art/archaeology or #) Methods for excavation of Old/New World sites. Meets at archaeological/computer lab for part of semester and at selected site in Minnesota for day-long sessions for 9 to 10 weeks.


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


Arth 5535. Style, Tradition, and Social Content in American Painting: Colonial Era to 1876. (3 cr) America’s colonial, Revolutionary era, and 19th-century painters’ responses to the influence of European aesthetics. Key American painting types: portrait, rural genre, and landscape from Copley and Gilbert Stuart to the Hudson River School and the chroniclers of the Western frontier.

Arth 5536. Topical Studies in American Art. (3 cr) Course description varies from year to year, depending on the current research interests of the instructor and the needs and interests of advanced undergraduate and graduate students in modern and American art.

Arth 5546. American Architecture: 1840 to 1914. (3 cr) American architecture from 1840 to 1914, examined in relation to European precedents and American sociohistorical conditions. Critical attention to problems of style, the architectural profession, vernacular vs. “high” architecture, technology, economics, urbanism, and social reform.


Arth 5725. Ceramics in the Far East. (3 cr) Selective examination of representative pottery and ceramic wares produced in China, Korea, and Japan from the Neolithic era to modern times. Nearly every major ceramic type is represented.

Arth 5765. Early Chinese Art. (3 cr) Develop a more effective way to understand the unique qualities of an individual work of art. Concentration is on accessible works of art in local private and museum collections.

Arth 5766. Chinese Painting. (3 cr) Major works from the late bronze age to the modern era that illustrate the development of Chinese landscape painting and associated literary traditions.

Arth 5767. Japanese Painting. (3 cr) Japanese pictorial arts from the late tomb period to the modern era; special attention to the development of indigenous traditions.

Arth 5769. Connoisseurship in Asian Art. (3 cr) A selective examination of representative works of art produced in China from the Neolithic era to the Han Dynasty. Major archaeological sites and examples of art in local collections.

Arth 5775. Formation of Indian Art: 2500 BCE to 300 CE. (3 cr) Sculpture/architecture, from Indus Valley civilization through Kushana period.

Arth 5776. Redefining Tradition: Indian Art, 400 to 1300. (3 cr) India’s art/architecture, from earliest free-standing temples through 13th century. Focuses on temples, associated sculpture. Mural painting, beginnings of Islamic architecture in India.

Arth 5777. The Diversity of Traditions: Indian Art 1200 to Present. (3 cr. Prereq–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. Age 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 Persianate 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-verte” and “guerrilla television” and work by independents (e.g., Errol Morris, Michael Moore).

Arth 5940. Topics: Art of the Film. (3-4 cr) Topics in film history including individual directors (e.g., Hitchcock, Welles), genres (e.g., westerns, musicals), and other topics (e.g., American independent filmmaking, film noir).

Arth 5950. Topics: Art History. (2-4 cr [max 12 cr]) Topics specified in Class Schedule.

Arth 5993. Directed Study. (1-4 cr [max 12 cr]; A-F only. Prereq–#)

Arth 5994. Directed Research. (1-4 cr [max 12 cr]; A-F only. Prereq–#)

Asian Languages and Literatures (ALL)

Department of Asian Languages and Literatures

College of Liberal Arts


ALL 1904. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr) Topics specified in Class Schedule and Course Guide.

ALL 1905. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr) Topics specified in Class Schedule and Course Guide.

ALL 1909W. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr) Topics specified in Class Schedule and Course Guide.

ALL 1910W. Freshman Seminar. (3 cr [max 6 cr]; A-F only. Prereq–Fr or no more than 36 cr) Topics specified in Class Schedule and Course Guide.

ALL 3001. Reading Asian Cultures. (3 cr; A-F only) Introduction to primary Asian texts in translation. Emphasizes introducing/applying various methods of interpretation to a particular text in sequence. Close reading, methodological rigor. Practice, application.

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

ALL 3110. Study of an Asian Language. (1-5 cr [max 10 cr. Prereq–A]) Study of an Asian language in another country or at other non-campus locations. Students study in situations complementary to regular University course offerings.
Astronomy (Ast)
Department of Astronomy

Ast 1001. Exploring the Universe. (4 cr. §Jpn 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 1005. Descriptive Astronomy. (3 cr. §Jpn 1011H. Prereq—Non-science major)
Twentieth century astrophysics, current frontiers of astronomical research.

Ast 1011H. Exploring the Universe, Honors. (4 cr. §Jpn 1001. Prereq—High school trigonometry, high school physics or chemistry)
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. Honors version of Ast 1001.

Ast 1901. Freshman Seminar. [1-3 cr]
Topics vary. See Class Schedule.

Ast 1905. Freshman Seminar. [1-3 cr]
Topics vary. See Class Schedule.

Ast 1910W. Freshman Seminar, Writing Intensive. (1-3 cr. Prereq—Fr with no more than 24 cr)
Topics vary. See Class Schedule.

Ast 2001. Introduction to Astrophysics. (4 cr. Prereq—1 yr calculus, Physics 1302, #)
Physical principles and study of solar system, stars, galaxy, universe. How observations and conclusions are made.

Ast 2990. Directed Studies. (1-5 cr. Prereq—Fr with no more than 24 cr)
Independent, directed study in observational and theoretical astrophysics. Arranged with faculty member.


Ast 4002. Astrophysics II. (4 cr. Prereq—Astro 2001, Physics 2601)

Ast 4011. Stars and Stellar Evolution. (4 cr. Prereq—Astro 2001, Physics 2601 or #)

Ast 4021. Galaxies and the Milky Way. (4 cr. Prereq—Astro 2001, Physics 2601 or #)
Survey of structure, kinematics, evolution of the Milky Way, external galaxies, their constituents. Emphasizes observed properties of galaxies.

Ast 4101. Computational Methods in the Physical Sciences. (4 cr. Prereq—Upper div CLA or upper div IT or grad or #)
Introduction to using computer programs to solve problems in physical sciences. Selected numerical methods, mapping problems onto computational algorithms. Arranged lab.

Ast 4299H. Senior Honors Astrophysics Research Seminar. (2 cr. Prereq—Upper div honors student in IT or CLA or #)
Based on department’s research seminar.

Ast 4990. Directed Studies. (1-5 cr. Prereq—Astro 2001, #)
Independent, directed study in observational and theoretical astrophysics. Arranged with faculty member.
Course Descriptions


BP 3503. Marketing of Bio-based Products. (4 cr; A-F only) Intro to marketing function as it relates to current/ emerging bio-based products industries (building materials, paper, fuels, etc.). Product positioning, pricing, promotion, and channel management within strategic planning and environmental marketing management.

BP 4001. Chemistry of Plant Materials. (4 cr; A-F only) Prereq-[I002 or WPS 1301], Chem 2301, Chem 2302 or #. Chemical principles underlying structure, properties, processing, and performance of plant materials.

BP 4200H. Honors Seminar. (1 cr; A-F only. Prereq-BP upper div honors, #) Current topics presented by faculty/students. Lecture/discussion.


BP 4302. Organisms Impacting Bio-based Products. (3 cr. Prereq-1002 or WPS 1301) Organisms of importance to bio-based products: deterioration, control, bioprocesses for benefit.

BP 4303. Bio-based Materials Science. (3 cr. Prereq-[3001 or WPS 4301], ME 3321) Basic principles of materials science, their application to bio-based materials.


BP 4362W. Pulping and Bleaching. (4 cr. Prereq-BP 4305 or WPS 4305) Chemistry/technologies in producing paper-making raw material. Focuses on wood pulping/bleaching, including non-wood fibers and recycled fiber materials. Online course.

BP 4401. Bio-based Products Engineering. (4 cr; A-F only. Prereq-[BAE 3013, BAE 4013] or #) Unit operations of bio-based products engineering/manufacture.

BP 4402. Bio-based Products Engineering Lab I. (1 cr. A-F only. Prereq-[I1002 or WPS 1301], BAE 4713) or # Laboratory exercises in bio-based products engineering.

BP 4403. Bio-based Products Engineering Lab II. (1 cr; A-F only. Prereq-[I1002 or WPS 1301], 4402, BAE 4713) or # Laboratory exercises in bio-based products engineering.

BP 4404. Bio-based Composites Engineering. (3 cr; A-F only. Prereq-[4301 or WPS 3001] or 4303 or WPS 4302] Properties of bio-based composites.

BP 4405. Process Control and Simulation. (3 cr. Prereq-4401 or #4401, 4402 or #4402, 4403 or #4403, BAE 4713, Chem 4011, CE 3502, ME 3321) Fundamental principles in system dynamics and control. Emphasizes process systems, problems faced by process engineers.

BP 4406. Understanding Wood. (2 cr. Prereq-UC only) For woodworking professionals and serious craftspersons. Cellular structure of wood, identification of woods and softwoods, interaction of water and wood. No prior technical training in wood properties is needed, although general experience with woodworking is helpful.

BP 4411. Application and Performance of Wood-based Composites in Action. (2 cr. A-F only. WPS 3001 or WPS 1301 or WPS 4406 or #. UC or CCE) Physical/mechanical properties of composites. Composite applications/installations.


BP 4413W. A Systems Approach to Residential Construction. (3 cr. Prereq-Upper div BP or #) Dynamic/interrelated issues of energy; moisture control, indoor air quality in residential bldgs. Emphasizes design, construction, and operational aspects to provide an energy efficient, durable structure/healthy living environment. Special consideration to interaction between moisture and wood products within building system.

BP 4414. Advanced Residential Building Science. (3 cr. Prereq-3001 or WPS 4301) Theory, advanced applications for residential buildings. Focuses on heat/mass transfer.

BP 4415. Advanced Residential Building Science Lab. (1 cr; A-F only. Prereq-[1001, 4413W or #) or ([WPS 4301, 4303, 4333] or ([[BAE 4401, 4403, 4433]]) or (BAE 4301, 4333)) Exercises on advanced applications of heat/mass transfer to predict performance of residential buildings.


BP 4491. Senior Topics: Independent Study. (1-4 cr. Prereq-Sr.) Independent study in student’s area of interest.

BP 4501. Process and Product Design I. (2 cr. Prereq-[BAE 3013, BAE 4013, upper div BP] or #) Students develop, formulate, and complete an open-ended, engineering process-design project at conceptual level.

BP 4502W. Process and Product Design II. (3 cr. Prereq-[BAE 3013, BAE 4013, upper div BP] or #) Students develop, formulate, and complete an open-ended, comprehensive engineering process and product design project.

BP 4504W. Bio-based Products Development and Management. (3 cr; A-F only. Prereq-Upper div BP or #) Concepts of new-product development and product management, their application to bio-based products.

BP 4801H. Honors Research. (2 cr; A-F only. Prereq-BP upper div honors) First semester of independent research project supervised by faculty member.


BP 5001. Chemistry of Plant Materials. (4 cr; A-F only. Prereq-Grad student or #) Chemical principles underlying structure, properties, processing, and performance of plant materials.

BP 5301. Surface and Colloid Science in Bio-based Products Manufacturing. (3 cr. Prereq-Grad student or #) Principles of surface operations, their application to manufacturing/performance of bio-based products.

BP 5302. Organizations Impacting Bio-based Products. (3 cr. Prereq-Grad student or #) Organizations and their importance to bio-based products: deterioration, control, bioprocesses for benefit.

BP 5303. Bio-based Materials Science. (3 cr. Prereq-Grad student or #) Basic principles of materials science, their application to bio-based materials.


BP 5362. Pulping and Bleaching. (4 cr. Prereq-Grad student or #) Chemistry/technologies in producing paper-making raw material. Focuses on wood pulping/bleaching, including non-wood fibers and recycled fiber materials. Online course.

BP 5401. Bio-based Products Engineering. (4 cr; A-F only. Prereq-Grad student or #) Unit operations of bio-based products engineering/manufacture.

BP 5402. Bio-based Products Engineering Lab I. (1 cr; A-F only. Prereq-Grad student or #) Laboratory exercises in bio-based products engineering.

BP 5403. Bio-based Products Engineering Lab II. (1 cr; A-F only. Prereq-Grad student or #) Laboratory exercises in bio-based products engineering.
Biochemistry (BioC)

Department of Biochemistry

College of Biological Sciences

BioC 1001. Elementary Biochemistry. (3 cr; Prereq: 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 undergraduates who desire an introduction to biochemistry including students in health science programs such as dental hygiene or occupational therapy.

BioC 2011. Biochemistry for the Agricultural and Health Sciences. (2 cr; Prereq: Biol 1002 or 1009) Fundamentals of biochemistry including structure and function of proteins, nucleic acids, lipids and carbohydrates; metabolism and regulation of metabolism; quantitative treatments of chemical equilibrium, enzyme catalysis and bioenergetics; the chemical basis of genetic information flow.

BioC 2301. Biochemistry (3 cr; Prereq: Biol 1002 or 1009). Prereq—Grad student or #) Fundamental principles in system dynamics/control. Emphasizes process systems and problems faced by process engineers.


BioC 5561. Microbial Genomics and Bioinformatics. (3 cr; Prereq—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.

BioC 5401W. Advanced Metabolism and Its Regulation. (3 cr. Prereq—BioC 2301 or Biol 3021) Underlying principles that determine metabolism of common/unusual compounds in plants, animals, microorganisms. Regulation of carbon, energy flow in whole organisms.

BioC 5444. Muscle. (3 cr; Prereq: BioC 5444. Prereq—BioC 3021 or Biol 4331 or Phsi 3061 or #) Muscle structure/function: molecular mechanism by which force is generated.

BioC 5446. Membrane Biochemistry. (2 cr; Prereq—BioC 2301 or Biol 2302 or Biol 4331 or or MicB 41111, [Biol 3301 or MicB 3301]) Membrane structure. Mechanisms and physiological roles of channels, pumps, and membrane enzymes.

BioC 5527. Introduction to Modern Structural Biology. (4 cr. Prereq—(Intro biochemistry, intro physics) or physical chemistry or #) Methods employed in modern structural biology to elucidate macromolecular structures. Primary focus on X-ray diffraction, nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry. Principles underlying structural biology and structures/function relationships.


BioC 5530. Selected Topics in Molecular Biophysics. (1-3 cr [max 9 cr]; Prereq—$527 or $528 or equiv) Topics from 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.

Course Descriptions
Course Descriptions

Biol 5531. Macromolecular Crystallography I: Fundamentals and Techniques. (1 cr; S-N only. Prereq-[[Organic chemistry course], [two calculus or college physics courses] or #) Macromolecular crystallography for protein structure determination/engineering. Determining macromolecule structure by diffraction.


Bioinformatics (BInf)
Department of Laboratory Medicine and Pathology Medical School
BInf 5480. Bioinformatics Journal Club. (1 cr [max 12 cr]; S-N only) Bioinformatics Journal Club

BInf 5490. Topics in Bioinformatics. (1-6 cr [max 12 cr]. Prereq-#) Independent or group study in bioinformatics.

Biology (Biol)
College of Biological Sciences

Biol 1002W. Introduction to Biology: Molecular, Cellular, and Developmental Perspectives. (5 cr; A-F only §1009. Prereq-[1001 or equiv], Chem 1021) Chemistry of living things, cell structure/transplant, energy processing in cells, introduction to primary metabolism, molecular genetics, cell physiology, cell cycles, principles of animal/plant development, regulation of development. Lab focuses on molecular scientific techniques, investigative designs.


Biol 1020. Biology Colloquium. (1 cr [max 2 cr; S-N only] Introduction to diverse fields of biology through seminars, lab tours, trips to Itasca Biological Station, and interaction with other biology students and faculty. Course may be repeated once.

Biol 1041. Preparation for Graduate Programs in Science. (1 cr; S-N only. Prereq-#) Necessary elements for excelling in mathematics, physical and biological sciences to prepare for graduate work in science. Required for new freshmen in the Mathematics and Science Tutorial (MST) Program.

Biol 1093. Biology Colloquium: Directed Study. (1 cr; S-N only. Prereq-1020 and §1020) Individual study or research undertaken by a student concurrently enrolled in Biol 1020 with oversight by a faculty sponsor.

Biol 1101W. Heredity and Human Society. (3 cr. Prereq-No cr if taken after 4013 or GC3 3022) Principles of heredity and their social and cultural implications.


Biol 1805. Nature of Life: Introducing New Students to the Biological Sciences. (1 cr; S-N only. Prereq-Fr in College of Biological Sciences) Biological sciences, from molecules to ecosystems and from laboratory to field. Biology, introduction to the College of Biological Sciences community and opportunities. Held at Itasca Biological Station and Laboratories, Transportation, board, and lodging fee.

Biol 1901. Freshman Seminar for the Biological Sciences. (1-2 cr; A-F only) Orientation to University environment. Special topics illustrate importance of biological issues.

Biol 1903. Freshman Seminar for the Biological Sciences. (1-2 cr; A-F only) Orientation to University environment. Special topics illustrate importance of biological issues.

Biol 1905. Freshman Seminar for the Biological Sciences. (1-2 cr; A-F only) Orientation to University environment. Special topics illustrate importance of biological issues.

Biol 1909. Freshman Seminar for the Biological Sciences. (1-2 cr; A-F only) Orientation to University environment. Special topics illustrate importance of biological issues.

Biol 1910W. Freshman Seminar for the Biological Sciences. (2 cr; A-F only) Orientation to University environment. Special topics illustrate importance of biological issues.

Biol 1981. Intersections of Biology at Lake Itasca. (1 cr; A-F only. Prereq-1002 or #) Plant biochemistry, terrestrial ecology, aquatic ecology, ecological genetics, molecular biology. Ten-day course at Itasca Biological Station and Laboratories in north central Minnesota. Lab, field work.

Biol 2005. Animal Diversity Laboratory. (1 cr. Prereq-credit will not be granted if credit for: 2012: 3211 or §3211) Dissection and direct observation of representatives of major animal groups.


Biol 2201. Introduction to Computing in Biology. (1 cr; S-N only. Prereq-[1002 or 1009 or #; biological sciences major] Hands-on use of microcomputers to show how computers manipulate data, prepare graphs/graphics, acquire/analyze scientific data, perform literature searches, prepare scientific presentations, communicate via network.

Biol 2822. General Botany. (3 cr; A-F only. §2022. Prereq-[1001 or 1009], #) Principles of plant biology. Organization, function, growth/development, and reproductive biology of plants and plant-like organisms. Lab, field work.

Biol 2960H. Explorations in the Biological Sciences: Honors Colloquium. (1 cr; A-F only. Prereq-CBS honors program, soph, #) Students explore various areas of biological research, interact with scientists and fellow students, and prepare an in-depth review paper.

Biol 3002. Plant Biology: Function. (2 cr. Prereq-1002 or 1009; one sem chemistry with some organic content [e.g., Chem 1011], §5005 or #5005 or § Hot 3005) How plants make and use food, the function and uptake; water relations; transport processes; growth and development.

Biol 3005W. Plant Function Laboratory. (2 cr. Prereq-§3002) Various plant processes at subcellular, organ, whole plant levels. Lab, recitation.


Biol 3211. Animal Physiology. (3 cr. Prereq-[1002 or 1009], Chem 1021; §2005 strongly recommended) Compares ways different animals solve similar physiological problems.

Biol 3407. Ecology. (3 cr. §3807, §EEB 3001. Prereq-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.


Biol 3411. Introduction to Animal Behavior. (3 cr. §3811. Prereq-1002 or 1009 or #) Biological study of animal behavior. Mechanism development, function, and evolution. Emphasizes evolution of adaptive behavior, social behavior in the natural environment. Lab.


Biol 3600. Directed Instruction. (1-2 cr [max 6 cr]; S-N only. Prereq-1020, upper div, application, # up to 4 cr may apply to major) Students assist with biology colloquium.

Biol 3610. Internship: Professional Experience in Biological Sciences. (1-6 cr [max 6 cr]; S-N only. Prereq—Acceptance into CBS Internship Program, internship workshop, #) Matches student’s academic or career goals with opportunities in industry, non-profit organizations, and government agencies.

Biol 3700. Undergraduate Seminar. (1 cr [max 3 cr]; S-N only) Faculty members lead groups of students in discussions on topics of current interest.

Biol 3807. Ecology. (4 cr. §3407. Prereq-[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. §3411. Prereq-[1002 or 1009 or #]) Biological study of animal behavior. Mechanism development, function, and evolution. Emphasizes evolution of adaptive behavior, social behavior in the natural environment. Lab, fieldwork.
Biol 5913. Biology for Teachers: Monarchs in the Classroom. (3 cr; Prereq—Elementary or middle school or high school or preservice teacher; A-F only) 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.

Biomedical Engineering (BMEn)
Department of Biomedical Engineering


BMEn 2601. Biomedical Engineering Undergraduate Seminar I. (1 cr. Prereq—A) Introduction to biomedical engineering from academic/industrial perspectives. Survey of current/emerging areas.

BMEn 2602. Biomedical Engineering Undergraduate Seminar II. (1 cr; Prereq—2601 or A) Continuation of 2601. Emphasizes biomedical engineering design and numerical analysis.

BMEn 3001. Biomechanics. (4 cr; A-F only. Prereq—Math 2374, Phys 1302, [BMEn upper div or A]) Statics, dynamics, and deformable body mechanics applied to biomedical/medical problems. Mechanical properties of tissues and commonly used biomedical engineering materials. Techniques for numerical solution of biomechanics problems. Lecture/laboratory.

BMEn 3002. Biomechanics Laboratory. (1 cr; A-F only. Prereq—Math 2374, Phys 1302, [BMEn upper div or A]) Not intended for students taking 3001. Laboratory experiments in statics, dynamics, and deformable body mechanics applied to biomedical/medical problems.


BMEn 3102. Biomedical Transport Processes Laboratory. (1 cr; A-F only. Prereq—Math 2374, Phys 1302, [BMEn upper div or A]) Not intended for students taking 3101. Laboratory experiments in momentum, heat, and mass transfer illustrated with applications in physiological processes.

BMEn 3201. Biotechnology and Bioinstrumentation. (4 cr; A-F only. Prereq—Math 2263 or Math 2374, Phys 1302, [BMEn upper div or A]) Principles of electrical phenomena, instruments relevant to biomedical applications. Lecture/laboratory.
Course Descriptions


BMEn 5201. Advanced Biomaterials. (3 cr. Prereq—[3001 or equiv]; [IT upper div or grad student] or #) Introduction to biomechanics of musculoskeletal system. Anatomy, tissue material properties. Kinetematics, dynamics, and control of joints/limb movement. Analysis of forces/motions within joints. Application to injury, disease. Treatment of specific joints, design of orthopedic devices/implants.

BMEn 5212. Tissue Mechanics. (2 cr; A-F only. Prereq—5201 or AEM 5501) Fundamental principles of continuum mechanics applied to physiological systems. Systematic consideration of individual tissues and organs. Relationships among histology, anatomy, physiology, and mechanical function in these tissues. Changes in mechanical properties related to pathology. Emphasizes tissues in the cardiovascular system.


BMEn 5351. Cell Engineering. (3 cr. Prereq—5301 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: receptor/ligand binding, 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. Prereq—Phsl 3061, Phsl 3071, Phsl 5061) Overview of physiology underlying thermoregulation in humans, clinical applications of heat transfer in humans, framework for design project.

BMEn 5444. Muscles. (3 cr) Muscle structure/function: molecular mechanism by which force is generated.

BMEn 5501. Biology for Biomedical Engineers. (3-4 cr. Prereq—Engineering upper div or grad student) Concepts of cellular structure/function. Basic principles of cell biology, tissue engineering, artificial organs.

BMEn 5502. Pathobiology of Medical Devices. (3 cr; A-F only. Prereq—IT upper div or grad student) Biological response to biomaterials presented in context of fundamental principles of cell injury, adaptation, repair, or death. Diversity of medical uses for biomaterials. Clinical applications of heat transfer in vivo.

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

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

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 professions through readings and discussions by faculty, practicing engineers, 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; A-F only. Prereq—Biol 1009, [Chem 1022 or 'Chem 1022]) Applied engineering principles in biological processes, classification of microbes of industrial importance, parameters for cellular control, modeling of cell growth/metabolism, enzymatic catalysis, bioreactor design, product recovery operations design, case studies.


BAE 3093. Directed Studies. (1-5 cr. Prereq—#) Independent study of topic(s) involving physical principles as applied to agricultural production and land resources.

BAE 3213. Engineering Principles and Applications. (3 cr. §AET 3213, Prereq—Math 1031 or Math 1142 or equiv) 3 cr (phys or chem), intended for non-engineering students) Engineering principles/concepts. Students quantitatively apply mechanical/engineering principles to solve problems in animal production, crop production, horticulture, and soil/water management.


BAE 4023. Instrumentation and Control for Biological Systems. (3 cr. Prereq—EE 3005 or EE 3005, Stat 3021, upper div IT) Measurement of motion, 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; A-F only. Prereq—2113, upper div IT, or #) Review of design concepts and process. Case studies involving engineering design. Discussion of safety/ethical issues. Develop proposal for senior design project (individual or group) to be completed in 4122. Oral presentation of written proposal.

BAE 4114W. Capstone Design Project. (4 cr; A-F only. §1121, §1122. Prereq—2113, upper div IT or §1 or #) Design concepts, design process. Case studies involving engineering design. Health, safety, and ethical issues facing engineers. Proposal for capstone design team project, including oral presentation of written proposal. Comprehensive design project, including written report, poster, and oral presentation of final design.

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

BAE 4313. Design of Machine Systems. (3 cr. Prereq—AEM 3021, 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 parlor design, waste-handling machines).


BAE 4523. Water Management Engineering. (3 cr; A-F only. Prereq—3023 or CE 3301, CE 3502, upper div IT) 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. Prereq—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; A-F only. Prereq—3013, upper div IT) Fermentation and separation as applied to biological systems; product recovery in bioprocess technology; topics in bioremediation; modeling of separation processes in biological systems.

BAE 4723. Food Process Engineering. (3 cr. Prereq—CE 3502, [ME 3324 or ‘ME 3324]) Application of principles of heat transfer and fluid flow to design of food processing operations such as thermal/aseptic processing, freezing, pumping, drying, evaporation, extrusion. Marketing, government regulation, nutrition issues.

BAE 4744. Engineering Principles for Biological Scientists. (4 cr; A-F only. §5Сh 4311. Prereq—Math 1142 or Math 1271, Phys 1101; intended for non-engineering students) Material/energy balances applied to processing systems. Principles of fluid flow, thermodynamics, heat, mass transfer applied to food and bioprocess unit operations such as pumping, heat exchange, refrigeration/freezing, drying, evaporation, and separation.

BAE 4900. Intern Reports. (2 cr [max 4 cr]; S-N only. Prereq—IT or COAFES student in BAE, #) Reports on intern work assignments reviewed by faculty, practicing engineers, and honors opportunities. Ethics, safety, and environmental issues.

BAE 5095. Special Problems. (1-5 cr; A-F only. Prereq—#) Advanced individual-study project. Application of engineering principles to specific problem.

BAE 5203. Environmental Impacts of Food Production. (3 cr. §AgET 5203. Prereq—Intended for non-engineering students) Crop production intensity, animal raising options, food processing waste alternatives, pest control.
BAE 5212. Safety and Environmental Health Issues in Plant and Animal Production and Processing. (3 cr; A-F only. Prereq—5212. PreArr—Grad student or sr or #) Safety/environmental issues in food production, processing and horticultural work environments using public health, injury control, and health promotion frameworks; regulation, engineering, education. Traumatic injury, occupational illness, ergonomics, pesticides health effects, biotechnology, air contaminants.

BAE 5513. Watershed Engineering. (3 cr. Prereq—Pre-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. (2-3 cr; A-F only) Topics vary. See Class Schedule.

BA 1998. Independent Study. (1-4 cr [max 8 cr]. Prereq—CSOM [fr or soph], #) Special project or independent study.

BA 3000. Career Skills. (1 cr; A-F only. Prereq—CSOM [soph or jr]) Career planning. Use of Carlson School of Management’s Business Career Center. Students gain awareness, knowledge, skills associated with career/job search process.

BA 3033V. Honors: Business Communication. (3 cr; A-F only. Prereq—Fr composition, CSOM honors) Written/oral communication skills for effective participation in contemporary organizations. From basic principles to communication strategy. Communication technology. Cases, simulations of “real-world” situations. Student small groups meet with instructor three times for presentation coaching/feedback. Recitation times are arranged with instructor at start of semester.

BA 3033W. Business Communication. (3 cr; A-F only. Prereq—Fr composition, CSOM upper-div at least 60 cr) Written/oral communication skills for effective participation in contemporary organizations. From basic principles to communication strategy. Communication technology. Cases, simulations of “real-world” situations. Student small groups meet with instructor three times for presentation coaching/feedback. Recitation times are arranged with instructor at start of semester.

BA 3100. Global Seminar. (3 cr [max 12 cr]; A-F. PreArr—Undergrad, GPA of at least 2.50) Topics vary from year to year.

BA 3101W. Global Seminar, Supplemental Writing. (1 cr [max 2 cr]; A-F only. Prereq—§3100) Projects developed by instructor of Global Seminar. Students analyze/process intercultural experience of studying abroad. Individualized feedback/coaching in writing skills. Taught during intersession. Writing intensive, if concurrently enrolled in 3100.

BA 3701H. Healthcare Marketplace: Principals and Agents in a Trillion-Dollar Economy. (4 cr [max 4 cr]; A-F only) Introduction to healthcare sector markets for goods/services. Physician services, hospital services, insurance, long-term care, pharmaceuticals, medical devices, information technology. Lectures, recitations, presentations from healthcare business leaders.

BA 3990H. Honors Topics. (2 cr [max 4 cr]; A-F only) Topics vary.

BA 3998. Independent Study. (1-6 cr [max 16 cr]. Prereq—CSOM upper div, #) Student-initiated project or independent study.

BA 3999. Internship Seminar. (1 cr; S-N only. Prereq—30 cr; approved internship, #) Integrates students’ internship experiences with in-class discussions, relevant readings/assignments on issues related to world of work, workplace, and transition from college to work.

BA 4000H. Honors Seminar. (3 cr; A-F only. Prereq—At least 90 cr; CSOM honors) Capstone course. Topics of broad interest that are organizational or cross-functional in nature.

BA 5100. BSB—Foreign Studies. (1-16 cr [max 32 cr]; S-N only. Prereq—#) Registration for approved undergraduate study abroad programs.

Business and Industry Education (BIE)

Department of Work, Community, and Family Education

College of Education and Human Development

BIE 1396. Supervised Career and Technical Education Teaching. (2 cr; S-N only. Prereq—Approval of adviser) 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 the principles and processes of the technologies through hands-on work and lab activities.


BIE 3114. Construction Technology. (3 cr. Prereq—§3111) Introduction to principles, concepts, and techniques involved in civil, commercial, and residential construction. Laboratory experiences in planning, designing, organizing, producing, and testing structures. Lab.

BIE 3121. Communication, Power and Energy, Transportation and Machinery Technologies. (3 cr; A-F only) Instruction and laboratory experiences in communication, information, power, energy, and transportation technology areas. Projects include power systems; transportation systems; information and communication systems; graphic communication and computer applications.

BIE 3122. Communication and Information Technology. (3 cr; A-F only. Prereq—§3121) Information/computer systems, electronic publishing, printing technology, broadcast/recording technologies, telephone/online communication, photography, multimedia, and computer technology. Lab.


BIE 3151. Technical Development: Advanced. (1-30 cr [max 30 cr]; Prereq—#) Work experience in business/industry.

BIE 3993. Directed Study: BIE. (1-4 cr [max 4 cr]) Self-directed study preceded by classroom instruction in basic research procedures.

BIE 5001. Teaching Marketing Promotion. (3 cr; A-F only) Materials, methods, and approaches to teaching marketing promotion. Covers the basic elements of the marketing mix: advertising, promotion, public relations, direct selling, visual merchandising, and direct marketing.

BIE 5011. Introduction to Computer Applications. (3 cr) Instructional uses of computers and representative business/marketing education applications, including word processing, databases, spreadsheets, and graphics.

BIE 5012. Advanced Word Processing. (3 cr. Prereq—5011 or equiv) Develop/apply solution methods for office problems using word processing software including advanced editing, printing, and desktop publishing capabilities.

BIE 5013. Spreadsheet Analysis Using Computers. (3 cr. Prereq—5011 or equiv) Using spreadsheets to analyze data, monitor business records, and create models.

BIE 5014. Database Computer Applications. (3 cr. Prereq—5011 or equiv) Business needs for computerized databases. Using database software to develop, maintain, and prepare reports.

BIE 5015. Integrated Computer Applications in Business and Marketing Education. (3 cr. Prereq—§5011, 5012, 5013, 5014 or equiv) Realistic business computer problems requiring integration of two or more application packages. Pedagogical issues of learning/teaching advanced computer applications.

BIE 5080. Special Topics in Business and Industry Education. (1-4 cr [max 4 cr]) Content varies by offering.

BIE 5101. Technological Problem Solving. (3 cr; A-F only. Prereq—§5111, 5112, 5113, 5112) Capstone technology education course in which students research problems relative to various technological systems and develop solution(s) to the identified problems.

BIE 5151. Technical Development: Specialized. (1-12 cr [max 12 cr]; A-F only. Prereq—#) Students select/study technical processes/principles based on subjects they plan to teach, integrate specialized technical instruction in advanced/emerging areas.

BIE 5321. Vocational Guidance in Business and Industry Education. (2 cr; A-F only) Self assessment, use of occupational and labor market information, job seeking skills, work and work satisfaction. For industrial teachers and trainers in school and industry settings.

BIE 5325. Foundations of Industrial Education. (3 cr) Social, economic, psychological, philosophical, legislative, and pedagogical foundations of industrial education in the United States. Comparison with selected foreign countries. Analysis of contemporary trends against backdrop of early foundations.

BIE 5343. Facilities Management in Business and Industry Education. (2 cr; A-F only. Prereq—§5322) Planning, evaluating, and managing industrial education shop and lab facilities.

BIE 5365. Curriculum Development in Technology Education. (3 cr) Conceptualization and derivation of content for the K-12 technology curriculum. Comparison of U.S. approaches to technology curriculum with selected countries.

For definitions of course numbers, symbols, and abbreviations, see page 300.
Course Descriptions

BIE 5440. Business and Industry Observation and Seminar. (1-3 cr; max 6 cr)
Current health practices and career opportunities in business and industry. Planned experiences in work environments and related seminars.

BIE 5452. Methods of Teaching Business and Marketing Concepts. (3 cr; A-F only)
Recent research/developments in teaching business concepts related to marketing, business organization/management, business law, entrepreneurship, marketing, international business, information systems, accounting, risk management, and personal finance.

BIE 5457. Methods of Teaching Business Employment and Marketing Employment. (3 cr; A-F only)
Recent research/developments in teaching for business employment. Administrative support positions, accounting/information processing, marketing, sales, computer operations, other occupations using desktop computing.

BIE 5463. Methods in Teaching Keyboarding and Word Processing. (2 cr; A-F only)
Implementing keyboarding and word processing: effective teaching strategies; expected learner outcomes; evaluation methods; selecting hardware; instructional materials (including print, software, Internet); organizing and managing labs.

BIE 5475. Curriculum Development for Business and Marketing Education. (3 cr; A-F only)
Introduction to conceptual models for design/ delivery of business/marketing education programs in secondary/postsecondary schools, in adult education settings, and in business/industry. Preparing programs of instruction for secondary/ postsecondary level. Making decisions regarding course content.

BIE 5596. Occupational Experience in Business and Industry. (1-10 cr; max 10 cr; S-N only. Prereq.-#)
Observation/employment in business/industry to develop technical/occupational competencies. Includes 100 clock hours of supervised work experience per credit.

BIE 5597. Internship: Business and Industry Education. (1-8 cr [max 12 cr]. Prereq.-#)
Practical experience in business or industry as a professional educator or supervisor. Requires an integrative paper.

BIE 5605. Critical Issues in Business and Industry. (3 cr)
Identification and analysis of major current issues in business and industry education.

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; trouble-shooting 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. Prereq.-5011 or equiv)
Designing, creating, and presenting information using multimedia resources in business settings.

BIE 5662. Computer Training in School and Industry Settings. (3 cr. Prereq.-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 5801. The Business of Tourism. (3 cr; A-F only)
Introduction to major theories, concepts, skills, and techniques influencing tourism business/industry.

BIE 5802. Education and Human Resource Development Through Tourism. (3 cr; A-F only)
Policies/practices of education and human resource development in tourism industry.

BIE 5803. Tourism Studies Capstone Seminar. (3 cr; S-N only. Prereq.-Tourism studies major)
Students present, critique, and discuss implications of supporting programs for tourism.

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 Law (BLaw)
Department of Accounting

Curts L. Carlson School of Management

BLaw 3056. The Law of Contracts and Agency. (4 cr; A-F only. Prereq.-#)
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 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.

BLaw 5088. Law of Personal Property, Real Property, and Commercial Paper. (2 cr)
Basic concepts of personal property, including rights of possessors, bailees, and finders and holders of security interests. Real property law. Transfers of ownership, control of and encumbering such interests. The law of paper (negotiable instruments).

Center for Spirituality and Healing (CSpH)

Health Sciences

CSpH 5000. Explorations in Complementary Therapies and Healing Practices. (1-4 cr; max 12 cr. Prereq.-#)
Research/practice, delivery of complementary therapies, regulatory issues.

CSpH 5010. Introduction to Complementary Healing Practices. (3 cr; Prereq.-# or sr or grad student or #)
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, homeopathy, manual therapies, and nutrition.

CSpH 5102. Art of Healing: Self as Healer. (1 cr. Prereq.-# or sr or grad student or #)
Introduction to individual transformational journey as part of health science education. Students become aware of their responsibility/resources to facilitate development of the self. Research data, experience of self that is part psychoneuroimmunology, mind-body-spirit approaches. Lecture, scientific literature, meditation, imagery, drawing, group interaction.

CSpH 5111. Ways of Thinking About Health. (2 cr. Prereq.-# or sr or grad student or #)
Diverse healing traditions and 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.

CSpH 5201. Spirituality and Resilience. (2 cr. Prereq.-# or sr or grad student or #)
Links between resilience and spirituality. Applications of resilience/health realization model to students’ personal/professional lives. Review of literature, theory, and research.

CSpH 5221. Peacemaking and Spirituality: A Journey toward Healing and Strength. (3 cr; A-F only. Prereq.-#)
Influence of spirituality on resolving conflict, making peace in intense interpersonal/intrapersonal conflicts in multiple health care, social work settings.

CSpH 5251. Forgiveness and Healing: A Journey Toward Wholeness. (2 cr. Prereq.-#)
Impact of forgiveness on interpersonal/peronal healing. Forgiveness/healing in health care and social work settings from multiple spiritual/secular traditions.

CSpH 5221. Significant Spiritual Texts of the 20th Century. (2 cr. Prereq.-#)
Diverse “spiritual classics” (i.e., elements of western canon that have proven over time to be resources of values). Resources of meaning for inner-lifer healers. How to establish a personal library for life-long journey of spiritual development.

CSpH 5225. Meditation: Integrating Body and Mind. (2 cr. Prereq.-# or sr or grad student or #)
Meditation as a physical, emotional, intellectual, and spiritual inquiry. Students examine a variety of texts and develop ability to enter a state of calm, meditative awareness.

CSpH 5226. Advanced Meditation: Body, Brain, Mind, and Universe. (1 cr. Prereq.-#)
Students work to integrate meditation practice into daily life, cultivating awareness of the fundamental oneness of body, brain, mind, and universe. Mind-body interactions in health. “Hard problem” of consciousness in brain science. Emergence of compassion, wisdom, and healing in non-discursive awareness.

CSpH 5301. Cultures, Faith Traditions, and Health Care. (2 cr. A-F only. Prereq.-#)
Culturally/spiritually based health care practices of selected native/immigrant populations in Minnesota. Clinical implications. Personal/professional conflicts for delivery of competent care to culturally diverse groups by those trained in Western health care.

CSpH 5311. Introduction to Traditional Chinese Medicine. (2 cr. A-F only. Prereq.-#)
Philosophical roots of Shamanism, Confucianism, Taoism, and Buddhism. Influence of these philosophies on Chinese medicine. Evolution of concepts of the Tao, Yen-Yang, microcosm, macrocosm. Development of herbal medicine. Tui Na, Qi Gong, acupuncture, moxibustion. Traditional Chinese medicine etiology of disease, physiology, diagnosis, therapy, disease prevention, ethics, psychology, cosmology.

CSpH 5315. Traditional Tibetan Medicine: Ethics, Spirituality, and Healing. (2 cr. Prereq.-# or sr or grad student or #)
Ethics, spirituality, and healing from perspective of traditional Tibetan medicine. Belief that illness results from imbalance and that treating illness requires correcting underlying imbalance. How to apply these principles, integrate them into clinical practice, and consult with a traditional Tibetan doctor.
CSpH 5317. Yoga: Ethics, Spirituality, and Healing. (2 cr. Prereq—S101, S315) or #)
Ethics, spirituality, and healing from perspective of yoga, an ancient Indian discipline. Students test the claim that systematic yoga practice leads to optimal health. Evaluating yoga’s philosophy, scientific evidence, practical application. Students propose research-based programs for integrating yoga into personal/professional life.

CSpH 5321. Public Health Priorities in the Developing World. (2 cr. Prereq—jr or sr or grad student or #)
Primary public health problems, priorities, and interventions in developing countries. Issues related to culture/indigenous health systems and of concern to health care providers who work abroad or with refugee communities in countries of resettlement.

CSpH 5325. Latinos: Culture and Health Perspective. (3 cr. Prereq—jr or sr or grad student or #)
How Latino world view (cosmovision) affects health and compares with U.S. perspective. Differences in perception of time, family involvement, community “belonging,” gender roles, and communication styles. Folkloric beliefs. Specific issues such as AIDS, pregnancy, women’s issues, pharmacy, and nutrition. Health issues of workers. Cultural competency.

CSpH 5331. Foundations of Shamanism and Shamantic Healing. (2 cr. S5-Only: Prereq—jr or sr or grad student or #)
3-day retreat intensive. Shamantic philosophies, ritual etiquette. Core beliefs common to all shamantic healing practices. Cross-cultural healing beliefs/practices, unique psychology for understanding them, their use with contemporary healing practices and personal growth.

CSpH 5332. Global Healing Traditions: Amazonia Plant Spirit Medicine. (2 cr. S5-Only: Prereq—S331, [grad student or jr or sr or in health science or practicing health professional] or #)
Non-biomedical traditional healing paradigms as practiced in other parts of the world. Focuses on indigenous healing practices in Peru as directed by a local shaman.

CSpH 5401. People, Plants, and Drugs: Introduction to Ethnopharmacology. (3 cr. Prereq—jr or sr or grad student or #)
Biologically active substances used in traditional cultures. Ethnopharmacology’s past, current, and potential contributions to human knowledge. Concrete examples.

CSpH 5405. Plants in Human Affairs. (4 cr. Prereq—jr or sr or grad student or #)
Twelve-day, intensive course. Introduction to ethnobotany/ethnopharmacology. Lectures, field trips, presentations by local experts.

CSpH 5411. Dietary Supplements: Regulatory, Scientific, and Cultural Perspectives. (3 cr. Prereq—jr or sr or grad student or #)

CSpH 5421. Botanical Medicines in Complementary Healthcare, (3 cr. Prereq—jr or sr or grad student or #)
Widely-used herbal medicines from biomedical perspective. Alternative therapeutic systems presented according to bodily systems/processes. Evidence for therapeutic use. Botanical characteristics, traditional uses, chemical properties, dosage, hazards/safety issues, quality control.

CSpH 5501. Therapeutic Use of Plant Essential Oils. (3 cr. Prereq—jr or sr or grad student or #)
Intended for students in health sciences or practicing health professionals; [basic science, health science knowledge, computer skills, internet skills] recommended. Fundamentals of essential oil therapy for licensed health professionals. History, scientific basis, practice issues, use of 30 essential oils in clinical practices, Controlled use of essential plant oils for specific, measurable physiological/psychological therapeutic outcomes. Topical application, inhalation.

CSpH 5511. Interdisciplinary Palliative Care: An Experiential Course in a Community Setting. (2 cr)
Multidisciplinary student teams partner with interdisciplinary community hospice teams in delivery of care to patients in a variety of settings. Series of seminars employs self-analysis/case studies.

CSpH 5521. Therapeutic Landscapes. (3 cr. Prereq—jr or sr or grad student in [health sciences or therapeutic recreation or horticulture or landscape architecture] or health professional or #)
Principles of therapeutic design for specific population requirements. Therapeutic landscape design. Incorporates interdisciplinary interaction between horticulture, landscape architecture, and health science departments.

CSpH 5533. Introduction to Energy Healing. (2 cr. Prereq—jr or sr or grad student or #)
Healing techniques (Therapeutic Touch, Reiki, acupuncture, reflexology, magnets, homeopathy) that use energetic systems in the body to enhance the body’s ability to heal. Scientific theories. Students interact with practitioners and have the opportunity to experience feeling “energy.”

CSpH 5535. Reiki Healing. (1 cr. 5-Only: Prereq. jr or sr or grad student or #)
History, principles, precepts, and practical application of Reiki energy healing. Alternative energy healing modalities, current research findings. Activation of the Reiki energy, hand positions to perform a treatment. Students provide Reiki treatments, discuss findings.

CSpH 5541. Integrative Psychotherapy. (3 cr. Prereq—S102, [grad student or #]
In depth, experiential-based training. Support for students to practice integrative psychotherapy, mindfulness meditation, and related mind/body approaches to clinical work. Multiple client/patient populations, issues, and settings.

CSpH 5545, Mind-Body Healing Therapies. (2 cr; A-F only: Prereq—Grad student or jr or sr or #)
Philosophies/paradigms. Four modalities commonly used in allopathic medicine, nursing and other health professions (biofeedback, hypnosis, imagery/visualisation, meditation). Experiential and group discussion format.

CSpH 5555. Introduction to Body and Movement-based Therapies. (2 cr. Prereq—jr or sr or grad student or #)
Theories/approaches of selected somatic therapies, including dance, movement, and body-based therapies. Historic/theoretical perspectives on use of movement, dance, and soma re-patterning. Demonstrations of techniques. Application of techniques to specific populations/settings.

CSpH 5601. Music, Health, and Healing. (2 cr. Prereq—jr or sr or grad student or #)

CSpH 5611. Healthy Humor. (1 cr. Prereq—jr or sr or grad student or #)
Use of humor to enhance communication, treatment, and relationships with patients. How to create a positive work environment and outlook. Physiologic effects/benefits of humor/laugher. Humor and spirituality. Connection between positive outlook and health.

Central Asian Studies (CAS)
Institute of Linguistics, ESL, and Slavic Languages and Literatures
College of Liberal Arts
CAS 1904. Freshman Seminar. (3 cr; A-F only)
Topics vary. See Class Schedule.

CAS 3511. Ancient Iran. (3 cr. §MELC 3511)
Development of ancient Iranian culture under the Achaemenids and Sassanians; the impact of the Zoroastrian religion on Iranians and of Hellenism 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. §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. §MELC 3526)
Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communism in the Middle East; White Paper of the Soviet Union.

CAS 3532. Russia and Central Asia. (3 cr. §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 3533. Islam and the West. (3 cr)
Cultural/intellectual trends that have defined the fundamental differences between Islam and the West. Development of the historical, philosophical, and intellectual mindset of both spheres. Factors that have contributed and continue to contribute to tension, anxiety, and hatred between the Muslim world and Europe and the United States.

CAS 3601. Persian Fiction in Translation. (3 cr. §MELC 3601)
Impact of westernization on Iran, from 1920s to present. Materials produced by Iranian writers, film makers, and intellectuals. Internal/external forces that bind contemporary Iranian society to world civilization. Works of Hedayat (especially Blind Owl), Chubak, Al-i Ahmad, Daneshvar, and Behrang are analyzed/interpreted.

CAS 3602. Persian Poetry in Translation. (3 cr. §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, Yoush, and Farkhizad are among the poets whose works are examined.

CAS 3900. Topics in Central Asian Studies. (1-4 cr [max 16 cr]; A-F only)
Topics vary. See Class Schedule or contact department for details.

CAS 5311. Medieval Sages. (3 cr. §MELC 5311. Prereq—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, Sâ’di, and Firdowsi are among the sages whose lives are examined.

For definitions of course numbers, symbols, and abbreviations, see page 300.
Course Descriptions

CAS 5526. Islam and Communism. (3 cr. §3526, §MELC 5526)
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 5532. Russia and Central Asia. (3 cr. §3532, §MELC 5532)
Rise and fall of the Mongol Empire, formation of the Chaghatai 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. Persian Fiction in Translation. (3 cr. §3601, §MELC 3601, §MELC 5601)
Impact of westernization on Iran, from 1920s to present. Materials produced by Iranian writers, film makers, and intellectuals. Internal/external forces that bind contemporary Iranian society to world civilization. Works of Hedayat (especially Blind Owl), Chubak, Al-i Ahmad, Daneshvar, and Behranghi are analyzed/interpreted.

CAS 5602. Persian Poetry in Translation. (3 cr. §3602, §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.

CASN 5994. Directed Research. [1-10 cr. Prereq.-#] (A, Q)

Chemical Engineering (ChEn)
Department of Chemical Engineering and Materials Science

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

ChEn 3701. Introduction to Biomolecular Engineering. (3 cr. [max 3 cr. A-F only. Prereq.-4001 or equiv.], [Chem 2302 or Chem 2302R or Math 2372 or equiv.], [Math 2237 or Math 2372 or equiv.]) Fundamentals of biological systems, from biomolecules to interplays of biomolecules that give rise to “processes” of life. Students apply chemical engineering principles to analysis of living systems.

ChEn 4001. Material and Energy Balances. (4 cr; A-F only. Prereq.-Chem 2902 or Chem 2302, [Chem 3501 or Chem 3501] or Chem 3501 or equiv., [Math 2237 or Math 2372 or equiv.], [Math 2374 or Math 2374 or Math 1302])
Introduction. Description and analysis of chemical engineering systems: units, dimensions, materials balances on systems without chemical reactions, elementary phase equilibria/ diagrams, energy balances. Elementary treatment of multistage steady-state equilibrium operations.

ChEn 4005. Transport Phenomena: Momentum and Heat. (4 cr; A-F only. Prereq.-[4001 or transfer student, A)]), [upper div ChEn major or A]) Fluid statics/dynamics and their applications to chemical engineering systems, conduction, and diffusion. Principles/applications of heat transfer in chemical engineering systems.

ChEn 4006. Mass Transport and Separation Processes. (4 cr; A-F only. Prereq.-[4001 or A], 4005, 4101, [upper div ChEn major or A])
Introduction to principles of mass transfer. Mass transfer operations used in separation processes, unit operations.

ChEn 4101. Chemical Engineering Thermodynamics. (4 cr; A-F only. Prereq.-[4001 or transfer student, A]), Chem 3501, [upper div ChEn major or A])
Applications of concepts of thermodynamics and chemical equilibrium to problems in chemical engineering.

ChEn 4102. Reaction Kinetics and Reactor Engineering. (4 cr; A-F only. Prereq.-4001, 4101, [upper div ChEn major or A])
Chemical equilibrium and chemical kinetics applied to chemical engineering problems. Behavior/design of chemical reactors, interaction between chemical and physical rate processes. Mathematical modeling, design of reactors.

ChEn 4201. Numerical methods in ChEn applications. (3 cr; A-F only. Prereq.-[4001 or A], [4005 or equiv.], [4006 or 4006 or equiv.], [upper div ChEn major or A])
Numerical methods and applications in heat/mass transfer and advanced chemical engineering applications.

ChEn 4214. Polymers. (3 cr. Prereq.-Grade of at least C in Math 3011 or A)

ChEn 4401W. Chemical Engineering Lab I. (1-4 cr; A-F only. Prereq.-4005, 4006, 4101, 4102, 4201, Chem 2311, Chem 4211, English composition requirement, upper div ChEn major or A)
Principles/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/written presentations.

ChEn 4402W. Chemical Engineering Lab II. (2 cr. Prereq.-4005, 4006, 4101, 4102, 4201, Chem 2311, Chem 4211, fr writing requirement, upper div ChEn major or A) Principles/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/written presentations.

ChEn 4501W. Chemical Engineering Process Design. (3 cr. Prereq.-[4005, 4006, 4101, 4102, 4201, Chem 2311, Chem 4211], fr writing requirement, upper div ChEn major or A)
Chemical Reaction Engineering economics of process evaluation, including time/bases for cost estimation. Engineering design through group projects. Case studies.

ChEn 4502W. Chemical Engineering Process Design II. (2 cr. A-F only. Prereq.-4501W, [upper div ChEn major or A])
Continue review from 4501 of unit processes/operations, introducing detail for design, cost analysis, control, operability, modifications, and alternatives. Case studies, special topics.

ChEn 4593. Directed Study. (1-4 cr. Prereq.-#)
Directed study under faculty supervision.

ChEn 4594. Directed Research. (1-4 cr. A-F only. Prereq.-#)
Independent lab research under faculty supervision.

ChEn 4601. Process Control. (3 cr; A-F only. Prereq.-4102, [upper div ChEn major or A])
Analysis of dynamic behavior/design of linear control systems for chemical processes. Dynamic response and stability of linear ODE systems, tuning of control systems. Introduction to control systems. Design of control systems using PID controllers, synthesis of feedback, feedback/feedforward control.

ChEn 4604. Process Control Laboratory. (2 cr; A-F only. Prereq.-Chem 4601 or [Chem 4601])
Experiments designed to reinforce concepts and principles of process control taught in 4601. Introduction industrial-process instrumentation and control, and use of computers for data acquisition, analysis, and control.

ChEn 4701. Advanced Undergraduate Applied Math I: Linear Analysis. (3 cr; A-F only. Prereq.-4002)
Introduction to solving mathematical problems (linear algebraic equations, linear ordinary/ partial differential equations) using theoretical/numerical analysis based on linear operator theory. Undergraduate version of 8201.

ChEn 4702. Advanced Undergraduate Rhotology. (2 cr; A-F only. Prereq.-4002, #)

ChEn 4703. Advanced Undergraduate Applied Math II: Nonlinear Analysis. (3 cr; A-F only. Prereq.-Chem 4002, grad-level course in linear analysis recommended)
Nonlinear mathematical problems (nonlinear ordinary/partial differential equations) using theoretical/numerical analysis. Undergraduate version of 8202.

ChEn 4704. Advanced Undergraduate Physical Rate Processes I: Transport. (3 cr; A-F only. Prereq.-4002)

ChEn 4705. Advanced Undergraduate Physical Rate Processes II: Mass Transfer. (3 cr; A-F only. Prereq.-4002)
Applications of mass transfer. Membranes, including gas separation and reverse osmosis. Controlled drug release. Dispersion, including examples of pollution modeling. Adsorption/chromatography. Coupled heat/mass transfer, including cooling towers. Double-diffusive effects. Undergraduate version of 8302.

ChEn 4706. Advanced Undergraduate Physical and Chemical Thermodynamics. (3 cr; A-F only. Prereq.-Chem 3502, 4101, 4102; recommend background in undergraduate engineering or chemistry courses in thermodynamics)
Principles of classical thermodynamics, introduction to nonequilibrium thermodynamics. Applications in chemical engineering, materials science. Undergraduate version of 8301.

ChEn 4707. Advanced Undergraduate Statistical Thermodynamics and Kinetics. (3 cr; A-F only. Prereq.-Chem 4002, 4101, Chem 3501, Chem 3502)
Introduction to statistical mechanical description of equilibrium/non-equilibrium properties of matter. Emphasizes fluids, classical statistical mechanics. Undergraduate version of 8402.

ChEn 4708. Advanced Undergraduate Chemical Rate Processes: Analysis of Chemical Reactors. (3 cr; A-F only. Prereq.-4102)

ChEn 4709. Advanced Undergraduate Process Control. (3 cr; A-F only)
For linear systems: stability, controllability, observability, pole-placement via state feedback state observers, output feedback, robustness of control systems. For nonlinear systems: solution properties, stability analysis, singular perturbations, feedback linearization via state feedback, direct synthesis via output feedback. Undergraduate version of 8502.

ChEn 4710. Advanced Undergraduate Chemical Rate Processes: Homogeneous Reactions. (3 cr; A-F only. Prereq.-4102)
Description/characterization of chemically reacting systems. Theories of elementary reactions. Experimental methods for investigating elementary reactions. Applications of chemical kinetics to complex reactions such as combustion, flames, atmosphere. Undergraduate version of 8503.


ChEn 5221. Introduction to Polymer Chemistry. (3 cr; A-F only. Prereq-[3502, Chem 2302] or §) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerization. Conformation, solution thermodynamics, molecular weight characterization, physical properties.

ChEn 5302. Chemical Reaction Engineering and Catalysis. (3 cr; A-F only. Prereq-ChEn 4102) Continuous and batch reactors, heat management, catalysis, application of fundamental flow in reactors, polymerization, solids processing, multiphase reactors. Fundamentals and mechanism of catalytic reactions. Industrial examples in petroleum/chemical industries.


ChEn 5595. Special Topics. (1-4 cr. Prereq—#) New or experimental special topics.

ChEn 5751. Biochemical Engineering. (3 cr; A-F only. Prereq-4002, 4103, 4102) Chemical engineering principles applied to analysis/design of complex cellular/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 5754. Food Processing Technology. (3 cr; A-F only. Prereq-ChEn 4002) Introduction to food processing as it interfaces with engineering. Case studies. Engineering economics and practical design problems in 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; A-F only. Prereq-ChEn 4002) Principles of mass transfer in gases, liquids, biological and macromolecular solutions, gels, solids, membranes, and capillaries. Porous solids interaction between mass transfer and chemical reaction. Applications of chemical systems, environmental, and mineral, chemical engineering systems.

ChEn 5771. Colloids and Dispersions. (3 cr; A-F only. Prereq-Physical chemistry) Preparation, stability, coagulation kinetics or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures.

Chem 1011. General Principles of Chemistry. (4 cr. Prereq-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, equilibria. Problem solving emphasized. Physical and chemical properties of hydrocarbons and organic compounds containing halogens, nitrogen, or oxygen.


Chem 1022. Chemical Principles II. (4 cr. Prereq-ChEn 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 1032. Honors Chemistry II. (4 cr. A-F only. Prereq-1031 or equiv) [IT honors student or consent of IT honors office] 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 1095. Freshman Seminar. (1-3 cr; A-F only. Prereq-Fr with no more than 23 cr) Topics vary. See freshman seminar topics.

Chem 1910W. Freshman Seminar: Writing Intensive. (1-3 cr; max 4 cr; A-F only. Prereq for fewer than 24 cr) Topics vary. See freshman seminar topics.

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

Chem 2101. Introductory Analytical Chemistry Lecture. (3 cr. Prereq-1022 or equiv; §2301) Primarily for chemistry majors. Methods and concepts 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. Prereq-2101 or §2101) 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. Prereq-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. Prereq-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. (4 cr. Prereq-2302 or §2302) Lab techniques in synthesis, purification, and characterization of typical organic compounds.

Chem 2312. Honors Organic Lab. (5 cr; A-F only. Prereq-[2501 or §2301], [Chem or ChemE or BioC] major, #) Honors organic chemistry lab.

Chem 2910. Special Topics in Chemistry. (1 cr; max 6 cr; S-N only. Prereq-1 semester 1xxx chemistry or #) Topics in chemistry. Opportunities and current research.

Chem 2920. Special Topics In Chemistry. (1 cr; max 6 cr; S-N only. Prereq-1 semester 1xxx chemistry or #) Topics in chemistry. Opportunities and current research.

Chem 3001. Chemical Literature and Information Retrieval. (1 cr; S-N only. Prereq-2302 or §2302) Forms of chemical literature, relationships among them. Major information sources in chemistry. Basic search techniques for print/electronic sources, choosing sources most appropriate for various information needs.


Chem 4094W. Directed Research. (1-5 cr [max 75 cr]. Prereq-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; A-F only. Prereq—2101, 2111, 2311, 3501)
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; A-F only. Prereq—4101, chemistry major) Instrumental techniques, including spectrophotometric methods, electrochemical methods, and analysis based on separation. Emphasizes use of computers in data collection and reduction.

Chem 4211. Process Analytical Chemistry. (3 cr; A-F only. Prereq—4201, chemical engineering major) Strategies and techniques for analysis. Use of modern instruments, including spectrophotometry, chromatography, and electrochemistry.


Chem 4501. Physical Chemistry I. (3 cr; A-F only. Prereq—Grad student, one yr college chemistry, one yr college physics, one yr college calculus, ∆) Introduction to physical chemistry as it relates to macroscopic descriptions of chemical systems. Chemical thermodynamics, phase equilibria, chemical equilibrium. Phenomenological reaction kinetics. Kinetic theory of gases. Collision theory of reaction rates. Thermodynamic vs. kinetic control of chemical reactions.

Chem 4502. Physical Chemistry II. (3 cr; A-F only. Prereq—Grad student, one yr college chemistry, one yr college physics, one yr college calculus, ∆) Introduction to microscopic descriptions of chemical systems. Elementary quantum theory. Applications to atomic/molecular structure. Molecular spectroscopy. Quantum statistical mechanics. Statistical theories of reaction rates.


Chem 4701. Inorganic Chemistry. (3 cr. Prereq—2311, 3501 or 3502 or 3550 or 3552) Advanced introduction to inorganic chemistry. Periodic trends. Structure and bonding concepts 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; A-F only. Prereq—4701, chem major) Laboratory experiments in inorganic/organometallic chemistry illustrating synthetic/spectroscopic techniques.


Chem 5201. Materials Chemistry. (3 cr. Prereq—[[3502 or equiv], 4701] or ∆) Crystal systems, unit cells, phase diagrams, defects/ interfaces, optical/dielectric properties, electrical/thermal conductivity, X-ray diffraction, thin film analysis, electronic structure, polarons/phonnons, solid state chemistry, liquid/molecular crystals, polymers, magnetic/optical materials, porous materials, ceramics, piezoelectric materials, biomedical materials, catalysts.

Chem 5210. Materials Characterization. (4 cr; A-F only. Prereq—Graduate student or ∆) Modern systems/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. (3 cr. Prereq—Mats 2211, 2302, 3501 or ∆) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.


Chem 5245. Introduction to Drug Design. (3 cr; A-F only. Prereq—2302 or equiv) Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design and mechanism of action drugs.

Chem 5311. Chemistry of Industry. (3 cr. Prereq—Chem sr or grad student or ∆) Industrial and polymer chemistry technology. Relation of basic properties to industrial utility. Economics, social problems, industrial environment.

Chem 5321. Organic Synthesis. (3 cr. Prereq—2302 or equiv, ∆) Fundamental concepts, reactions, reagents, structural/stereochemical issues, and mechanistic skills for organic chemistry.

Chem 5322. Advanced Organic Chemistry. (3 cr. Prereq—2302 or equiv) Topics vary, including natural products, heterocycles, asymmetric synthesis, organometallic chemistry, and polymer chemistry. (See instructor for details.)

Chem 5352. Organic Chemistry. (3 cr. Prereq—2302, 5011 or 8011) Fundamental concepts and mechanistic tools for analysis of organic reaction mechanisms. Solvation, reactive intermediates, gas phase chemistry, photochemistry or strained-ring chemistry or both.

Chem 5361. Interpretation of Organic Spectra. (3 cr. Prereq—2302 or equiv) Application of nuclear magnetic resonance, mass, ultraviolet, and infrared spectral analyses to organic structural problems.

Chem 5412. Chemical Biology of Enzymes. (3 cr. Prereq—2302 or equiv) Enzyme classification with examples from current literature; strategies to decipher enzyme mechanisms; chemical approaches to control enzyme catalysis.

Chem 5413. Nucleic Acids. (3 cr. Prereq—2302 or equiv) Chemistry and biology of nucleic acids. Structure, thermodynamics, reactivity, DNA repair, chemical oligonucleotide synthesis, antisense approaches, ribozymes, techniques for nucleic acid research, interactions with small molecules and proteins.


Chicano Studies (Chic)

Department of Chicano Studies

College of Liberal Arts

Chic 1105. Introduction to Chicana/o Studies: The Beginnings to 1875. (3 cr) Convergence of Europe and America in Mesoamerica and the formation of Mexican society. Literary, social, cultural, and historical perspectives. Pre-Columbian period to 1875.

Chic 1106. Introduction to Chicana/o Studies: Mexico and the United States From 1871 to Present. (3 cr) Convergence of Spanish-Mexican/Anglo-American societies in Spanish borderlands. Formation of contemporary Chicano political, economic, and cultural consciousness; forms in which it has been expressed.

Chic 1901. Freshman Seminar. (3 cr; A-F only. Prereq—Chem grad student or ∆) Topics specified in Class Schedule.

Chic 1907W. Autobiographies of Latina/o Social Activists. (3 cr; A-F only. Prereq—Fr or less than 30 cr) Historical evolution of Latino/a social movements in 20th century through lives of civil rights, labor, and education activists. Short writing assignments, oral presentations. Discussions of readings and of film documentaries. No exams.
Chic 1908W. Freshman Seminar. (3 cr; A-F only. Prereq—Fr or max 36 cr)
Topics specified in Class Schedule.

Chic 3114. International Perspectives: U.S.-Mexico Border Cultures. (2 cr)
The relations of Mexico and the United States from an international perspective with central focus on the cultural interchange in the borderlands between them; use of both historical and cultural materials.

Chic 3212. La Chicana. (3 cr)
This class centers on Chicanas or politically defined women of the Mexican American community. Our method is interdisciplinary. It emphasizes the importance of historical context and cultural process to any discussion of the Chicana experience.

Chic 3213. Chicana/Latina Music and Art. (3 cr; A-F only)
Survey of diverse forms of cultural expressiveness in Mexican American music/art. History of various types of artistic production and musical forms in their regional specificity. Social/economic and political implications of several genres, styles, and traditions.

Chic 3375. Folklore of Greater Mexico. (3 cr)
Scholarly survey and exploration of the sociocultural function of various types of folklore in Greater Mexico. Students analyze the ways in which folklore constructs and sustains communities, as well as resists and engenders cultural shifts.

Chic 3423. Central American Revolutions. (3 cr; A-F only. [Hist 3423])
Social, political, and economic issues that have shaped Central American history for nearly two centuries. Colonial histories, capitalist development, ethnic/racial conflict, foreign intervention, Catholic Church, civil war throughout region. Readings/discussions cover events in Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama.

Chic 3425. History of Modern Mexico. (3 cr; A-F only)

Chic 3427. History of Cuba and Puerto Rico. (3 cr)
Historical development of Cuba and Puerto Rico from pre-Columbian times through the Spanish conquest to the present. Conquest and colonization, slavery, Hispanic Caribbean society and culture, Operation Bootstrap, Cuban Revolution.

Chic 3428. History of Relations Between U.S. and Mexico: 1821 to Present. (3 cr)
U.S.-Mexico relations in the 19th and 20th centuries; examining histories as they intersect in the late 1820s, Mexican-American War; economic relations between the two countries including NAFTA and the Chiapas rebellion of 1994.

Chic 3441. Chicana/o History to 1900. (3 cr)
History of the Mexican people from the 16th through 19th centuries. Historical theories of colonialism, expansion, economy, assimilation, migration, and settlement; race, class, and gender; political, social, and cultural interaction and conflict.

Chic 3442. Chicana/o History: 1900 to Present. (3 cr)
Migration, repatriation, the Bracero program, politics, the Chicana/o movement, work, society, and culture.

Chic 3507. Introduction to Chicana/o Literature. (3 cr)
Creative literature by Chicano and Chicana authors will be analyzed and interpreted through our understanding of Mexican American history, culture, and sociopolitical process; narratives as aesthetic production; merits and limitations of literary analysis.

Chic 3712. Chicana/os: Psychological Perspectives. (3 cr)
Textual analysis of Chicana/Latina writings with special emphasis on the psychological motivations of the subjects pertaining to race, class, and gender relationships.

Chic 3900. Topics in Chicano Studies. (3 cr; A-F only)
Issues affecting Chicanos, Latino/a population in the Twin Cities and in the U.S. Bilingual education. The Dream and Student Adjustment Acts. Driver’s licenses, ID cards, and workers’ rights. Students read articles on social concerns, write bibliographies, interview community members, write essays, participate in weekly seminar and community service projects, and write journals.

Chic 3993. Directed Studies. (1-9 cr [max 16 cr]. Prereq—#)
Guided individual reading, research, and study. Students often do preliminary readings and research in conjunction with plans for education abroad programs.

Chic 4231. The Color of Public Policy: African Americans, American Indians, and Chicanos in the United States. (3 cr)
Examination of the 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.

Chic 4401. Chicana/Latina Culture Studies. (3 cr)
Diversity of cultures that are called “Hispanic”; women in these cultures; Chicanas and Latinas living in the United States or migrating from their home nations to the United States.

Chic 5114. International Perspectives: U.S.-Mexico Border Cultures. (3 cr; § 3114. Prereq—Grad)
The relations of Mexico and the United States from an international perspective with central focus on the cultural interchange in the borderlands between them; using both literary and historical materials.

Chic 5920. Topics in Chicana(o) Studies. (3 cr. Prereq—Sr or grad student)
Multidisciplinary themes in Chicana/o studies. Issues of current interest.

Chic 5993. Directed Studies. (1-3 cr [max 16 cr]. Prereq—#)
Guided individual reading, research, and study for completion of the requirements for a senior paper or honors thesis.

Child Psychology (CPsy)

Institute of Child Development
College of Education and Human Development

CPsy 2301. Introductory Child Psychology. (4 cr. Prereq—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; A-F only. Prereq—CPsy 2301, Psy 1001)
Techniques used in the study of child development; emphasis on collection, organization, and analysis of data.

CPsy 3360. Child Psychology Honors Seminar. (2 cr; A-F only. Prereq—CPsy honors student)
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; A-F only. Prereq—CPsy 2201 or Psy 1001)
Perceptual, motor, 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; A-F only. Prereq—Psy 1001)
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]. Prereq—Psy 1001)
Topics/credits vary.

CPsy 4311. Behavioral and Emotional Problems of Children. (4 cr; A-F only. Prereq—Psy 1001)
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. Prereq—Psy 1001)

CPsy 4329. Biological Foundations of Development. (4 cr; A-F only. Prereq—CPsy 2301 or equiv)
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; A-F only. Prereq—CPsy 2301, Psy 1001)
Development of social relations and personality; research, methodology, and contrasting theoretical perspectives. Survey of findings on interpersonal relationships, the concept of self, prosocial and antisocial behavior, and acquisition of social roles.

CPsy 4334W. Children, Youth in Society. (4 cr; A-F only. Prereq—CPsy 2301)
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 peers).

CPsy 4336W. Development and Interpersonal Relations. (4 cr; A-F only. Prereq—CPsy 2301 or equiv)
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. Prereq—CPsy 2301)
Perceptual learning, development of sensory/perceptual processes.

CPsy 4343. Cognitive Development. (4 cr; A-F only. Prereq—CPsy 2301)
Cognitive processes; relevant theory, research literature, and methodology.

CPsy 4345. Language Development and Communication. (4 cr; A-F only. Prereq—CPsy 2301)
Structure and function of language: factors influencing development; methodological problems, language scales, theories.

CPsy 4347. Senior Project. (2 cr; A-F only Prereq—CPsy s/sr)
Current literature on self-selected developmental topic. Students write a literature review.

CPsy 4347W. Senior Project. (2 cr; A-F only Prereq—CPsy s/sr)
Current literature on self-selected developmental topic. Students write a literature review.

CPsy 4993. Directed Instruction in Child Psychology. (1-4 cr [max 8 cr]. S-N only. Prereq—4 cr CPsy, #)
Students serve as teaching assistants or peer advisers.

CPsy 4994. Directed Research in Child Psychology. (1-4 cr [max 8 cr]. Prereq—4 cr CPsy, #)
Individual empirical investigation. Students help plan/implement scientific studies, gain experience/expertise in methodology of research.

CPsy 4994H. Directed Research in Child Psychology (Honors Thesis). (1-6 cr [max 6 cr]. Prereq—4 cr CPsy. CPsy honors, #)
Individual empirical investigation. Students help plan/implement scientific studies while gaining experience/expertise in research methodology.

CPsy 4994V. Directed Research in Child Psychology (Honors Thesis). (1-6 cr [max 6 cr]. Prereq—4 cr CPsy. CPsy honors, #)
Individual empirical investigation. Students help plan/implement scientific studies while gaining experience/expertise in research methodology.
Course Descriptions

Chinese (Chn)
Department of Asian Languages and Literatures

College of Liberal Arts

Chn 1011. Beginning Modern Chinese. (6 cr)
Speaking and reading modern Chinese through structured practice.

Chn 1012. Beginning Modern Chinese. (6 cr. Prereq–3021 or equiv or #)
Speaking and reading modern Chinese through structured practice.

Chn 1015. Accelerated Beginning Modern Chinese. (5 cr. §1011, §1012. Prereq–#)
Mandarin Chinese. Reading, writing, standard pronunciation.

Chn 1016. Accelerated Intermediate Modern Chinese. (5 cr. §3021, §3022. Prereq–1012 or 1015 or #)
Modern standard Chinese skills developed further through conversations, writing, and reading.

Chn 3021. Intermediate Modern Chinese. (5 cr. Prereq–3021 or 3012 or 1015 or equiv or #)
Modern standard Chinese skills developed further through conversation and reading.

Chn 3031. Advanced Modern Chinese. (4 cr. Prereq–3022 or equiv or #)
Reading and analysis of 20th-century texts.

Chn 3032. Advanced Modern Chinese. (4 cr. Prereq–3031 or equiv or #)
Reading and analysis of 20th-century texts.

Chn 3041. Business Chinese. (4 cr. Prereq–3032 or equiv or #)
Reading and analysis of commercial and business texts.

Chn 3111. Introductory Classical Chinese. (4 cr. Prereq–3022 or equiv or #)
Study of classical Chinese through reading and analysis of representative texts.

Chn 3112. Introductory Classical Chinese. (4 cr. Prereq–3022 or equiv or #)
Study of classical Chinese through reading and analysis of representative texts.

Chn 3161. Media Cultures in Modern China. (3 cr. Prereq–Soph or higher; Chinese language not required, background in modern Chinese history recommended)
Relations among media technologies, cultural identities, and politics in China from 19th century to present. Emphasizes photography, graphic arts, popular music/recording. Some attention to cinema and popular fiction. Ways of analyzing popular/mass culture.

Chn 3201. Chinese Calligraphy. (2 cr)
Appreciation and execution of Chinese calligraphy through guided practice.

Chn 3202. Intermediate Chinese Calligraphy. (2 cr. Prereq–3201 or #)
Advanced techniques of composing Chinese characters using regular style of Chinese calligraphy.

Chn 3900. Topics in Chinese Literature. (1-4 cr [max 12 cr])
Topics specified in Class Schedule.

Chn 3920. Topics in Chinese Culture. (1-4 cr [max 12 cr])
Topics specified in Class Schedule.

Chn 4001. Beginning Modern Chinese. (3 cr. §1011. Prereq–[completed CLA second language requirement or grad student])

Chn 4002. Beginning Modern Chinese. (3 cr. §1012. Prereq–4001, [completed CLA second language requirement or grad student])
Speaking/reading modern standard Chinese through structured practice. Meets with 1012.

Chn 4003. Intermediate Modern Chinese. (3 cr. §3021, §3002. Prereq–[completed CLA second language requirement or grad student])
Modern standard Chinese skills developed through conversations, writing, and reading. Meets with 3021.

Chn 4004. Intermediate Modern Chinese. (3 cr. §3022. Prereq–4003, [completed CLA second language requirement or grad student])
Modern standard Chinese skills developed through conversation and reading. Meets with 3022.

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 4012W. Chinese Traditional Literature in Translation I. (4 cr. Prereq–3022 or equivalent, or grad student)
Representative works of Chinese literature in translation from end of T’ang dynasty until end of 19th Century.

Chn 4023. 20th-Century Chinese Literature in Translation. (4 cr. Prereq–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. Prereq–Background in modern Chinese history desirable; knowledge of Chinese language not required)
Main trends in Chinese literature from 1979 to the present.

Sources and methods in the study of the historical development of the Chinese language.

Chn 4125. Structure of Modern Chinese. (4 cr. Prereq–3022 or equiv or #)
Analysis of the grammatical structures of modern standard Chinese.

Chn 4234. Chinese Poetry in Translation. (4 cr. Prereq–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. Prereq–No knowledge of Chinese is required)
An introduction to narrative and fictional traditions in pre-modern China.

Chn 4241. Filmic Construction of Modernity in China. (4 cr)
A survey of important films made after the Cultural Revolution with a special emphasis on the critically acclaimed “Fifth Generation” filmmakers.

Chn 4292. Directed Reading. (1-5 cr. Prereq–#)
Guided individual reading or study.

Chn 5011. Research Methods. (4 cr. Prereq–3032 or 3112)
Guided individual reading or study.

Chn 5040. Readings in Chinese Texts. (2-4 cr [max 12 cr])
Students read authentic materials of various types to increase reading/speaking ability. Topics specified in Class Schedule.

Chn 5120. Topics in Chinese Linguistics. (4 cr [max 8 cr. Prereq–4121 or 4125]
Studies of the structure and change in the Chinese language.

Chn 5230. Topics in 20th-Century Chinese Literature. (4 cr [max 8 cr. Prereq–3032)
Studies of representative literary works from May 4, 1919 to the present.

Chn 5240. Topics in Chinese Poetry. (4 cr [max 8 cr. Prereq–3112)
Selected major Chinese poets and poetic forms.

Chn 5242W. Chinese Classical Drama and Theatre. (4 cr)
A multimedia course on traditional Chinese theatre.

Chn 5250. Topics in Chinese Fiction. (4 cr [max 8 cr. Prereq–3032 or 3112)
Studies of traditional and modern Chinese fiction.

Chn 5260. Topics in Premodern Chinese Prose. (4 cr [max 8 cr])
Studies of representative Chinese prose writings of the pre-modern period.

Chn 5393. Directed Study. (1-5 cr [max 18 cr. Prereq–#)
Guided individual reading or study.

Civil Engineering (CE)
Department of Civil Engineering

Institute of Technology

CE 0005. Refresher Course for Civil Engineers. (0 cr; S-N only. Prereq–BCE or equivalent degree or completion of Parts I and II of the State Board Examination)
Review of civil engineering fundamentals required to pass the Minnesota Professional Engineering Examination in civil engineering.

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; A-F only. Prereq–Math 1272, IT)

CE 3102. Uncertainty and Decision Analysis in Civil Engineering. (3 cr; A-F only. Prereq–Math 1371, Math 1372 or equiv)
Stochastic models and their usefulness in reasoning about uncertainty in civil engineering. Techniques for identifying, fitting, and validating models using data samples. Testing hypotheses about, and bounding the uncertainty attached to, important engineering parameters. Applications to problems arising in construction, environmental, geotechnical, structural, transportation, and water resources engineering.

CE 3111. CADD for Civil Engineers. (2 cr; A-F only. Prereq–3201)
Introduction to AutoCAD and land development desktop software. Students complete all tasks to design two-lane roadway using civil engineering design software, including topography, plan/profile, contours, cross sections, and quantity calculations.

CE 3201. Transportation Engineering. (3 cr. Prereq–Phys 1301)
Apply laws 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; A-F only. Prereq–IT or Math 1271, 1272) 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; A-F only. Prereq–Grade of at least C- in AEM 3031, IT) Analysis of determinate/inindeterminate 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; A-F only. Prereq–Grade of at least C- in AEM 3031, IT) 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 3406. Construction Materials for Managers. (3-4 cr; A-F only. Prereq–AEM 2011 or WPS 4301, construction management major) Basic concepts of physical properties and behavior mechanisms for construction materials such as concrete, steel, aluminum, and wood. Standard specifications for material properties. Laboratory techniques for evaluation of each material.


CE 4101W. Project Management. (3 cr; Prereq–Upper div IT or construction management) Survey of engineering project management, economics. Project planning, scheduling, and controlling. Budgeting, staffing, task cost control. Communicating with, motivating, leading, and managing conflict among team members. Engineering economics.

CE 4102W. Capstone Design. (3 cr; A-F only. Prereq– 3201, 3202, 3301, 3401, 3402, 3501, 3502) Teams formulate/solve civil engineering problems. From conceptual stage through preliminary planning, public hearings, design, environmental impact statements, final plans/specifications, and award of contracts.

CE 4111. Engineering Systems Analysis. (3 cr; Prereq–Upper div IT) “Systems” approach to problems. Operations research—decision engineering, network analysis, simulation, linear programming, and expert systems—is used to represent systems and assess trade-offs.

CE 4121. Computer Applications in Civil Engineering II. (3 cr; A-F only. Prereq–CE or upper div Geo 3501, Math 2243, Math 2373) Advanced application of computer tools and methods in solving partial differential equations from civil engineering problems. The major tools are Spreadsheet and Visual Basic programming. Methods include finite differences, boundary element, finite element, and control volume finite element.

CE 4170. Independent Study I. (1-4 cr [max 4 cr]; Prereq–[IT, AEM 3031] or upper div CE, approval of department co-director) Formal written report of work during six-month professional assignment.

CE 4180. Independent Study II. (1-4 cr [max 4 cr]; Prereq–[IT, AEM 3031] or upper div CE) Special studies in the planning, design, or analysis of civil engineering systems. Individual lab research problems, literature studies, reports. Supervised by staff.

CE 4190. Engineering Co-op Assignment. (2-6 cr; S-N only. Prereq–Upper div CE, approval of department co-director) Prereq–Upper div CE, approval of department co-director. Design of advanced civil engineering structural system. Lab problems, literature studies, reports. Supervised by staff.

CE 4201. Highway Design. (3 cr; A-F only. Prereq–CE or upper div Geo 3301, Math 3202, 3201 or #) 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; Prereq–Upper div IT, CE 3201, CE 3301, CE 3402 or #) 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; Prereq–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; A-F only. Prereq–Upper div IT or Grad in IT major, CE 3301, Ge 3311 or #) 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 4341. Engineering Geostatistics. (3 cr; A-F only. Prereq–CE, Geo 3301 or upper div Geo or grad, Stat 3202 or #) Problem solving and decision making in civil and geological engineering using applied statistics. Emphasizes sparsely correlated data, e.g., geologic site characterization, spatial sampling design.


CE 4352. Groundwater Modeling. (3 cr; A-F only. Prereq–Upper div IT or grad, CE 4351, Ge 3301 or #) 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; A-F only. Prereq–Grade of at least C- in 3401, §3402, [upper div IT or grad student]) Limit-states design. Steel: tension, compression, flexure, combined compression/flexure, connections. Concrete: beams in flexure/shear, one-way slabs, T-beams, development length, serviceability.

CE 4411. Matrix Structural Analysis. (3 cr; A-F only. Prereq.–[Grade of at least C- in 3101, 3401] or in a CSci programming course, [upper div IT or grad student]) or §Analysis of linear structural systems by matrix methods, stiffness, and flexibility methods. Introduction to computerized structural analysis of trusses/frames, including coding in programming language.

CE 4412. Reinforced Concrete Design II. (3 cr; A-F only. Prereq.–[Grade of at least C- in 4401, [upper div IT or grad student] or #; 4411 recommended) Advanced design of reinforced concrete structures: footings, retaining walls, columns with slenderness effects and biaxial loading, torsion, continuous systems, two-way floor systems.

CE 4413. Steel Design II. (3 cr; A-F only. Prereq.–[Grade of at least C- in 4401, [upper div IT or grad student] or #; 4411 recommended) Design of steel and composite steel/concrete structures, including multistory frames and plate-girders bridges. Beam-columns, torsion, connections, frames.


CE 4532. Open Channel Hydraulics. (4 cr; A-F only. Prereq–IT or grad, 3502 or #) 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 flood routing. Introduction to movable bed mechanics.

CE 4531. Environmental Process Engineering. (3 cr; A-F only. Prereq–3501, §4541) Physical principles that influence behavior of engineered and natural environmental systems. Flow behavior through reactors, mass transfer, interfacial effects, stability, kinetics.

CE 4561. Solid Hazardous Wastes. (3 cr. Prereq–IT or grad, Chem 1022, 3501 or #) 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; A-F only. Prereq–[3501, 4501] or #) Technology designed for removal of pollutants from groundwater and soils. Advances in technological design. Emerging technologies such as in situ bioremediation, phytoremediation. Role of environmental biotechnology in pollution abatement.

CE 5094. Civil Engineering Research. (1-4 cr [max 4 cr]; Prereq–[Grad student]) Research or independent study in concrete, structural steel, soils, hydraulics, hydrology/municipal, environmental, or transportation problems. Investigations, reports, tests, designs.
Course Descriptions

CE 5170. Internet Based Study. (1-5 cr [max 15 cr]; A-F only. Prereq–Upper div IT) Internet based teaching with bi-weekly exercises on topic of concern.

CE 5180. Special Topics. (1-4 cr [max 4 cr]; A-F only. Prereq–#) Topics vary depending on faculty and student interests.


CE 5214. Transportation Systems Analysis. (3 cr. Prereq–P 201) Systems approach, its application to transportation engineering/planning. Prediction of flows and level of service. Production functions, cost optimization, utility theory, demand modeling, transportation network analysis, equilibrium assignment, decision analysis, multidimensional evaluation of transportation projects.


CE 5232. Advanced Portland Cement Concrete. (3 cr. Prereq–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 mixture 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. Prereq–Upper div IT or grad. CE 3402 or #) Advanced topics in selection and design of bituminous materials. Asphalt cement, rheology, emissions, chip seals, hot-mix asphalt design, viscoelastic characterization. Lab assignments pertaining to rheology, mixture design and viscoelastic behavior.

CE 5311. Experimental Geomechanics. (3 cr; A-F only. Prereq–Upper div IT or grad. GE 4301 or #) Machine stiffness, closed-loop testing. Small-strain theory. Measurement of deformation: strain gauges, LVDTs, accelerometers, and associated circuits. Direct and indirect testing. Material behavior: experiments on anisotropic, damaged, and fluid-filled solids.

CE 5321. Geomechanics. (3 cr; A-F only. Prereq–Upper div IT or grad. GE 4301 or #) Elasticity theory and solution of elastic boundary value problems. Wave propagation in unbounded elastic media. Elements of fracture mechanics and applications. Elements of poroelasticity and applications.

CE 5331. Geomechanics Modeling. (3 cr; A-F only. Prereq–Upper div IT or grad. GE 4301 or #) Soil and rock response in triaxial testing; drained and undrained behavior; elastic and plastic properties. Modeling stresses, strains, and failure in geomechanics problems.

CE 5341. Wave Methods for Nondestructive Testing. (4 cr; A-F only. §GE 5531. Prereq–AEM 2021, AEM 3031 or #) Introduction to contemporary methods for nondestructive characterization of objects of civil infrastructure (e.g., highways, bridges, geotechnical sites). Imaging technologies based on propagation of elastic waves such as ultrasonic/resonant frequency methods, seismic surveys, and acoustic emission monitoring. Lecture, lab.

CE 5351. Advanced Mathematics for Civil Engineers. (3 cr; A-F only. Prereq–[Math 2263 or Math 2374 or equiv] or [or grad student] in civil engineering]) or #) Emphasizes skills relevant for civil engineers. Mathematical principles explained in an engineering setting. Applications from various areas in civil engineering.

CE 5411. Applied Structural Mechanics. (3 cr; A-F only. Prereq–[grade of at least C- in 4401, upper div IT or grad student] or #) Principal stresses and failure criteria in 3 dimensions. Introduction to plane elasticity, energy methods, torsion of beams, and bending of unsymmetrical beams.

CE 5412. Prestressed Concrete Design. (3 cr; A-F only. Prereq–[grade of at least C- in 4401, upper div IT or grad student] or #) Design of prestressed concrete structures. Time dependent effects, behavior, flexure, shear, torsion, deflections, continuous systems.

CE 5413. Masonry Structures. (3 cr; A-F only. Prereq–[grade of at least C- in 4401, upper div IT or grad student] or #) Masonry materials and their production. Mortars, grouts. Design of reinforced, reinforced, and prestressed masonry structural systems. Walls, columns, lintels, arches. Codes/specifications, testing, inspection.

CE 5541. Environmental Water Chemistry. (3 cr; A-F only. Prereq–3501, Chem 1021, Chem 1022) Introduction to water chemistry. Physical chemical principles, geochemical processes controlling chemical composition of waters, behavior of contaminants that affect the suitability of water for beneficial uses.


CE 5551. Environmental Microbiology Laboratory. (4 cr; A-F only. Prereq–3501, upper div IT or grad student) Role of microorganisms in environmental bioremediation, pollution control, water/wastewater treatment, biogeochemistry, and human health. Basic microbiological techniques: isolation, identification/ enumeration of bacteria, BOD, biograduation kinetics, disinfection. Lecture, lab.


CE 5582H, Honors Course Greek and Roman Mythology. (4 cr. §Clas 1042, §Clas 1042H) Introduction to stories/study of Greek/Roman mythology.

CE 5583. Classical Archaeology: Introduction to the Archaeology of Ancient Greece and Rome. (4 cr. §Clas 1043) Role that material culture, including art and architecture, plays in forming our picture of the Classical past. Relationship between archaeology and other disciplines dealing with the past. Study of selected sites considers motives/methods of research and how results are used by archaeologists and general public.

CE 5584. Etymology: Word Study in the Sciences and Humanities. (3 cr. §Clas 1045) 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.

CE 5591. Environmental Fluid Mechanics. (3 cr. §Clas 1008) Role that fluid mechanics plays in water resources development. Experiments with fluid flow in various systems. Fluid behavior in rivers, streams, and seashores. Fluid behavior in commercial, industrial, and civil engineering.

CE 5601. College of Liberal Arts

Classical and Near Eastern Studies (CNES)


CNES 1002. World of Greece. (3 cr. §Clas 1008) Ancient Greek civilization, from second millennium BCE to Roman period. Art/archaeology, philosophy, science, literature, social/political institutions. Focuses on connections between contemporary cultures corresponding to Ancient Near East.

CNES 1003. World of Rome. (3 cr. §Clas 1007) Roman civilization, from Etruscan origins to late antiquity. Cultural diversity of Mediterranean civilization. Ways of life, social, and political institutions as evidenced by literature, art, architecture, history, and material culture.

CNES 1042. Greek and Roman Mythology. (4 cr. §Clas 1042, §Clas 1042H) Introduction to the stories of Greek and Roman mythology.

CNES 1042H, Honors Course Greek and Roman Mythology. (4 cr. §Clas 1042, §Clas 1042H) Introduction to stories/study of Greek/Roman mythology.

CNES 1043. Classical Archaeology: Introduction to the Archaeology of Ancient Greece and Rome. (4 cr. §Clas 1043) Role that material culture, including art and architecture, plays in forming our picture of the Classical past. Relationship between archaeology and other disciplines dealing with the past. Study of selected sites considers motives/methods of research and how results are used by archaeologists and general public.

CNES 1045. Etymology: Word Study in the Sciences and Humanities. (3 cr. §Clas 1045) 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.

CNES 1046. Technical Terminology for the Health Professions. (3 cr. §Clas 1144) Greek and Latin prefixes, suffixes, and roots basic to the vocabulary of health professions; taught through computer-assisted instruction.


CNES 1082H. Honors Course Jus in Hispanic. (4 cr. §Clas 1082, §Clas 1082H, §RelA 1082, §RelA 1082H) Jesus of Nazareth in his original setting. Modern approaches to the historical Jesus. Perspectives/needs of early gospel writers, effects on portrayals of Jesus. Shifting representations of Jesus in new historical/cultural situations. Meets with Clas 1082.

Course Descriptions


CNE5 5080. New Testament Proseminar. (3 cr [max 18 cr.], §ArtH 1082 or 3072 or equiv) Study of some aspect of the New Testament and related literature. The class is organized as a discussion seminar. Topics specified in Class Schedule.


CNE5 5083. Ancient Comedy. (3 cr. §Clas 3083, §Clas 3083W, §Clas 5083) Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

CNE5 5103. Hellenistic and Early Roman Art and Archaeology. (2 cr. §ArtH 5103, §Clas 5103) Prereq-[[ArtH 3008 or Clas 3008], §ArtH 5101, §ArtH 5251, §ArtH 5252, §ArtH 5253, §ArtH 5254, §Clas 5082] 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 30 B.C. of the Roman Empire.

CNE5 5108. Greek Architecture. (2 cr. §ArtH 5108, §Clas 5108) Prereq-[[ArtH 3008 or Clas 3008], §Jr or #] Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor and Italy.

CNE5 5111. Prehistoric Art and Archaeology of Greece. (3 cr. §ArtH 5111, §Clas 5111) Prereq-[[Greek art or archaeology course], §Jr or #] Artistic and architectural forms of Neolithic period in Aegean area and Cycladic, Minoan, and Mycenaean cultures. Aimed at understanding the techniques and methods of modern field archaeology; the record of human habitation in the Aegean area. Archaeological evidence as a basis for historical reconstruction.

CNE5 5112. Archaic and Classical Greek Art. (3 cr. §ArtH 5112, §Clas 5112) Prereq-[[ArtH 5111 or Clas 5111], §Jr] Sculpture, painting 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.

CNE5 5120. Field Research in Archaeology. (3 cr. Prereq-# Field excavation, survey, and research at archaeological sites in the Mediterranean area. Techniques of excavation and exploration; interpretation of archaeological materials.

CNE5 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr. §ArtH 5172, §Clas 5172) Prereq-Intro art history course or # Architecture, painting, and sculpture of urban houses, country estates, and tombs in Roman world. Relationships between public/private spheres and literary/physical evidence. Usefulness of physical evidence in illuminating social and cultural aspects of Roman life. 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. Meets with 3340.

CNE5 5125. History of Early Christian Art in Context. (4 cr. §ArtH 5125, §Clas 5125) Prereq-Intro art history course or # Use of art in formation of early Christianity/Byzantine communities and in establishing their relationships with Pagan world and early Islam.

CNE5 5340. Practicum in Archaeological Field and Computer Techniques. (3 cr. Prereq-CICv major or # or one 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. Meets with 3340.

CICV 3510. Great Books. (3 cr [max 9 cr], §ArtH jor or sr or #) 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.

CICV 3711. Classics of Literary Criticism. (3 cr. Prereq-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.

CICV 3940. Proseminar: Classical Traditions in Western Culture. (3-4 cr [max 6 cr] Prereq-CICv 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.

CICV 3950. Topics in Classical Civilization. (3-4 cr [max 9 cr]) Topics specified in the Class Schedule.

CICV 3993. Directed Studies in Classical Civilization. (1-4 cr)

CICV 3994. Directed Research in Classical Civilization. (1-4 cr)

CICV 3996. Directed Instruction in Classical Civilization. (1-4 cr)

CICV 5120. Field Research in Archaeology. (3 cr) Field excavation, survey, and research at archaeological sites in Minnesota. Techniques of excavation and exploration. Interpretation of archaeological materials.

Clinical Laboratory Science (CLSV) Department of Laboratory Medicine and Pathology Medical School

CLSV 5064. Introduction to Clinical Immunohematology. (2 cr. F-A-F only) Prereq-# Principles of blood grouping, antibody identification, compatibility testing, serology, and immunology.

CLSV 5065. Introduction to Clinical Immunohematology: Laboratory. (2 cr. F-A-F only) Prereq-# Exercises illustrating techniques in blood grouping, antibody identification, compatibility testing, and detection of antibodies by serological and immunological methods.

Classical Civilization (CICv) Department of Classical and Near Eastern Studies College of Liberal Arts

CICv 1301. 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.

CICV 3301. The Olympic Games. (3 cr. §3201) 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.

CICV 3340, Practicum in Archaeological Field and Computer Techniques. (3 cr. Prereq-CICv major or # or one 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. Meets with 3340.
Course Descriptions

CLS 5090. Special Laboratory Methods. (1-2 cr; A-F only. Prereq–#) 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. (2 cr; A-F only. Prereq–Microbiology course with lab, biochemistry) Lab diagnosis of viral, fungal, and parasitic infections. Lecture and lab.


CLS 5105. Principles of Diagnostic Microbiology: Laboratory. (2 cr; A-F only. Prereq–One microbiology course with lab, one chemistry course, #) Current techniques used in lab diagnosis of infectious disease. Isolating/identifying bacteria/ yeasts. Antimicrobial testing. Laboratory.

CLS 5120. Seminar: Clinical Laboratory Science. (1 cr [max 3 cr]; S-N only. Prereq–#) Current literature. Presentation/discussion of research. Critical analysis, evaluation, discussion of current articles in student’s specialty area.

CLS 5125. Practicum Teaching. (1-2 cr; A-F only. Prereq–#) Supervised teaching experience, develop skills using instructional materials, tests, and measurements.

CLS 5127. Introduction to Management and Education I. (1 cr; A-F only. Prereq–#) Leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, labor safety, labor relations, government regulations.

CLS 5130. Practicum in Laboratory Administration. (2 cr; A-F only. Prereq–#) Supervised experience and assignment of specific problems related to lab service and management in health care institutions.

CLS 5135. Advanced Clinical Microbiology. (3 cr. Prereq–#) Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5140. Techniques for Teaching. (2 cr; A-F only. Prereq–#) Developing objectives, classroom activities, and evaluation criteria for medical technology education.

CLS 5155. Advanced Clinical Hematology. (3 cr. Prereq–#) Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5165. Advanced Clinical Immunohematology. (3 cr. Prereq–#) Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5175. Advanced Clinical Chemistry. (3 cr. Prereq–#) Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5251. Hematology I: Basic Techniques. (3 cr; A-F only. Prereq–#) Theory and application of basic principles and techniques in clinical hematology and hemostasis. Lecture and lab.

CLS 5252. Hematology II: Morphology and Correlation. (2 cr; A-F only. Prereq–5251 or MedT 4251) Fundamentals of blood and bone marrow examination emphasizing microscopic identification of immature and abnormal cells. Clinical correlation of lab findings in hematology and hemostasis. Lecture and lab.

CLS 5253. Hemostasis. (1 cr; A-F only. Prereq–5251 or MedT 4251) Theory and application of specific concepts and techniques in hemostasis and coagulation. Lecture and lab.

CLS 5310. Clinical Chemistry I: Lecture. (2 cr; A-F only. Prereq–Organic chem course with lab; biochemistry course, #) Principles and theory of clinical chemistry for assessing renal and metabolic diseases/dysfunction, electrolyte balance, and acid-base balance. Principles and processes for quality management in the clinical lab.

CLS 5311. Clinical Chemistry I: Laboratory Applications. (2 cr; A-F only. Prereq–One organic chemistry course with lab, one biochemistry course, #) Application of clinical chemistry principles and laboratory techniques in the analysis of urine, plasma, and body fluids. Emphasis on laboratory tests to evaluate renal function, electrolytes, and acid-base balance. Introduction to principles and processes for managing test quality. Laboratory.

CLS 5320. Clinical Chemistry II: Lecture. (2 cr; A-F only. Prereq–Organic chem course with lab, biochemistry course, 5310 or MedT 4310, #) Principles and theory of clinical chemistry for assessing metabolic disease/dysfunction involving hormones, enzymes, lipids/lipoproteins, cardiac function, liver, and digestive tracts. Emphasis on measurement methods and physiological significance.

CLS 5321. Clinical Chemistry II: Laboratory Applications. (2 cr; A-F only. Prereq–Organic chem course with lab, biochemistry course, 5310 or MedT 4310, #) Application of clinical chemistry principles and laboratory techniques in analyzing serum, plasma, and urine. Focus on tests to evaluate selected disorders. Developing lab and instrumentation use skills with emphasis on quality control and technique.

CLS 5768. Advanced Hematology. (5 10 cr [max 30 cr]. Prereq–#) Practical experience collecting bone marrow from patients. Diagnosing hematological diseases by evaluating and interpreting cells from clinical specimens of bone marrow, peripheral blood, and, if applicable, lymph nodes.

CLS 5864. Research Seminar. (1 cr [max 10 cr]; S-N only. Prereq–#) Lab research seminar series.

CLS 5865. Departmental Seminar. (1 cr [max 10 cr]; S-N only. Prereq–#) Departmental lab research seminar series.

College Of Liberal Arts (CLA)


CLA 1050. Faculty Mentor Freshman Seminar. (2 cr; A-F only. Prereq–, Faculty Mentor Program) Discussions led by faculty mentors on liberal education, nature of University life, major exploration, study skills appropriate to various disciplines.

CLA 1301. SEAM First Year Seminar. (2 cr; A-F only. Prereq–SEAM) Exploration of issues related to students’ academic/career interests. Multiculturalism, other skills. Small-group discussions.

CLA 1302. SEAM First-Year Colloquium. (2 cr; A-F only. Prereq–SEAM) Introduction to resources that enhance academic/professional interests. Focus on multiculturalism. Small group discussions led by professional staff, guest speakers.

CLA 1901. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr or no more than 36 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1902. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 36 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1903. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 36 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1904. Topics: Freshman Seminar. (1-3 cr; A-F only. Prereq–Fr with no more than 36 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1905. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 36 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1906W. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 36 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1907W. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 24 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1908W. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 24 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1909W. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 24 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 1910W. Topics: Freshman Seminar. (1-4 cr; A-F only. Prereq–Fr with no more than 24 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 3001. Success Strategies for Transfer Students. (1-5 cr; S-N only. Prereq–Fr with no more than 36 cr) Interdisciplinary seminar. Topics specified in Class Schedule.

CLA 3500. Topics. (2-4 cr [max 8 cr]) Topics specified in Class Schedule.

CLA 5500. Project Two: Wounded City. (5 cr [max 10 cr]) How do cultural practices respond to traumatic events? How does culture adjust itself in the face of historic changes? Analysis of New York City as a wounded city. Effects of traumatic experience on current artistic practices. Focuses on critical/alternative productions in visual arts and architecture. Two weeks on campus, one week in New York City.

For definitions of course numbers, symbols, and abbreviations, see page 300.
Course Descriptions

Veterinary Medicine (CVM)
Department of Communication Studies

Communication Studies (Comm)

Course Descriptions

College of Veterinary Medicine

Comm 3201. Introduction to Electronic Media Production
(3 cr; A-F only. Prereq–1101 or #) Production and criticism of messages for the electronic media. Theory and practice in planning, scripting, production, and criticism in various electronic media. Student productions in laboratory.

Comm 3204. Advanced Electronic Media Production
(3 cr; A-F only. Prereq–3201 or #) Video as communicative medium integrating visual/aural aesthetics. Creation of broadcast-quality production integrating message creation, audience analysis, argument development, and visual/audio scripting. Utilization of media aesthetics to develop/shape production content.

Comm 3211. Introduction to U.S. Electronic Media
(3 cr [max 3 cr]) Historical development and current issues in electronic media technologies and programming. Effects of governmental, industrial, and public organizations on message content. Problem areas of electronic media.

Comm 3401. Introduction to Communication Theory
(3 cr. Prereq–1101) Social scientific theory in communication. Communication history: logic of scientific theories and communication types of theories in interpersonal, small group, organizational, intercultural, and electronically mediated communication.

Comm 3402. Introduction to Interpersonal Communication
(3 cr) Nature and function of communication between individuals in informal and formal relationships. Communicative interactions from theoretical and practical viewpoints.

Comm 3404. Language Borderlands
(3 cr) Effect of multilingualism on self identity and sense of community. Subjective and social dimensions of being multilingual. Experience of language loss.

Comm 3405. Language and Gender
(3 cr. §WSt 3305. Prereq–One women’s studies course) Gender/communication. Interdisciplinary theory. Role of gender in communication, reinforcing, and changing gender relations in society.

Comm 3406. Language and Sexual Diversity
(3 cr) Language use in lesbian, gay, bi-sexual, and transgender communities. Ways in which sexual diversity affects language use.

Comm 3409. Nonverbal Communication
(3 cr) Nonverbal communication in interpersonal communication process. Nonverbal codes (touch, space, smell, eye contact) and their communicative functions (impression management, flirting, persuading, lying in relational contexts (intimate relationships, friendships, work relationships).

Comm 3411. Introduction to Small Group Communication
(3 cr) Cooperative thinking in task-oriented groups. Planning, preparing for, and participating in small groups in private and public contexts.

Comm 3422. Interviewing and Communication
(3 cr; A-F only. Prereq–1101 or #) Application of communication concepts in information interview process. Practical experience in planning, conducting, and evaluating informational, journalistic/elite, helping, persuasive, appraisal, and employment interviews. Class training and field experience.

Comm 3431. Persuasion Theories
(3 cr. Prereq–Soph recommended) Sociological, psychological, and communication perspectives. Theoretical knowledge applied to persuasion problems.

Comm 3441. Introduction to Organizational Communication
(3 cr. Prereq–1101 or equiv) Functions of communication in work groups, in organizational hierarchies, and between organizations.

Comm 3451W. Intercultural Communication: Theory and Practice
(3 cr. Prereq–Planning an intercultural experience) Theories of and factors influencing intercultural communication. Development of effective intercultural communication skills.

Comm 3452W. Communication and the Intercultural Experience
(3 cr. Prereq–Return from an intercultural experience) Intercultural experience explored through stories and storytelling, participant observation, and social scientific theory. Constructs include identity, learning styles, cultural adaptation, values, ethics.

Comm 3461W. Introduction to Rhetorical Theory
(3 cr. Prereq–1101) Theoretical systems intended to explain or direct the creation of public discourse. Traditional rhetoric and contemporary perspectives. Using theory to explain the appropriate regulated public discourse.

Comm 3605W. Persuasive Speaking and Speech Writing
(3 cr [max 3 cr]. Prereq–Soph) Performance and composition with critical inquiry into rhetoric theories. Develops writing, thinking, and speaking skills.

Comm 3615. Argumentation

Comm 3625. Communication Ethics
(3 cr; A-F only. Prereq–1101) Applying concepts/theories from philosophy and social science to ethical issues in interpersonal, group, organizational, intercultural, and media communication.

Comm 3631W. Freedom of Speech
(3 cr) Communication theories and principles that underlie the concept of freedom of speech in the United States. A variety of contexts and practices are examined in order to understand how communicative interaction should be described and, when necessary, appropriately regulated.

Comm 3970. Directed Study
(1-3 cr [max 6 cr]. Prereq–One Comm course. #, A) Guided individual research or study.

Comm 3980. Directed Instruction
(3 cr [max 6 cr]; S-N only. Prereq– 1101) Supervised planning/teaching of undergraduate courses.

Comm 3990. Research Practicum
(1-3 cr [max 6 cr]) How communication research is designed, implemented, and published. Focus is on working with senior faculty on their current research projects.

Comm 3995. Major Project
(1-2 cr; S-N only. Prereq–Comm major, #) Individualized instruction leading to completion of senior project.

Comm 4231. Comparing Electronic Media Systems
(3 cr. Prereq–2211 or #) Historical, political, and sociological aspects of electronic media systems throughout the world, including United States, Canada, Great Britain, France, Germany, and Russia. Regulation and impact on political, social, and economic development.

Comm 4235. Electronic Media and Ethnic Minorities—A World View
(3 cr) Representation and involvement of various ethnic groups (e.g., African-Americans, Native Americans in United States and Canada, Maori, Turks in Europe) in radio, TV, cable, Internet. Roles of government, industry, public organizations, and minority groups in regulating, managing, and financing ethnic media activities.
Comm 4291. New Telecommunication Media. (3 cr; A-F only. Prereq–3211 or #) Development and current status of new telecommunication media such as cable TV, satellites, DBS, MDS, and video disk/cassettes. Technology, historical development, regulation, and programming of these media and their influence on individuals, organizations, and society.

Comm 4407. Communication and Conflict. (3 cr; A-F only. Prereq–3401 or #) Aspects of conflict common across types of relationships. Theories as alternative lenses to illuminate aspects of conflict. Communication strategies to manage or resolve conflict.

Comm 4452W. Intercultural Interaction: Theory and Application. (3 cr. Prereq–#) Small group interaction across cultures for both international and U.S. students. Discussion, simulations, readings.

Comm 4471. Communication in Marriage and Family. (3 cr. Prereq–3401 or 3402 or #) Contemporary theories of marriage/family communication using life-cycle approach. Role/function of communication in changing relational contexts. Ways of improving marriage/family relationships.

Comm 4602W. Contemporary Political Persuasion. (3 cr. Prereq–1101, 3431 or #) Contemporary political speech. Ideologies in political persuasion.

Comm 4616. African American Civil Rights Rhetoric. (3 cr. Prereq–#) Uses the struggle of African Americans to explore and analyze philosophical concepts, political issues, moral complexities, and discursive characteristics of civil rights rhetoric.

Comm 4621W. Rhetoric of Feminism. (3 cr. Prereq–4615 or #) History and criticism of the rhetoric of feminism from 19th century to the present.

Comm 5110. Special Topics in Communication Theory. (3 cr [max 6 cr]) Advanced theoretical problems. See department office for current offering.


Comm 5220. Television Genres. (3 cr [max 3 cr]) Nature, historical development, and influence on society of specific genres of television programming: drama, situation comedy, mystery, soap opera. Program genre change over time and how society, government regulation, and economics of production influence that historical process.

Comm 5233W. Electronic Media and National Development. (3 cr) Use of electronic media to change social, political, economic, and cultural life. Use by developing nations to improve agricultural practices, hygienic standards, literacy, and awareness of civic responsibility.

Comm 5261. Political Economy of Media Culture. (3 cr. Prereq–3211 or #) Organizational practices of media communicators. Media content as link between communicators and audiences. How viewers use/process media content.

Comm 5401. Advanced Theories of Communication. (3 cr. Prereq–3401 or grad) Survey of major theoretical approaches to communication including, positivism, constructivism, and systems.

Comm 5402. Advanced Interpersonal Communication. (3 cr. Prereq–3401 or 3402) Social scientific approaches to interpersonal communication. Theory, research findings.


Comm 5406. Communication and Gender. (3 cr. Prereq–#) One women's studies course. # How gender affects verbal communication. Development of analytical skills through readings, exercises, research that raise awareness of the power of language and the influence of gender prescriptions. Comparisons across languages where possible.


Comm 5411. Small Group Communication Research. (3 cr. A-F only. Prereq–3411 or #) Survey of small group communication research; theory and practice. Group decision-making and leadership.

Comm 5421. Quantitative Methods in Communication Research. (3 cr; A-F only. Prereq–3401 or #) Social scientific methods used in studying human communication. Optional data processing laboratory for additional credit.

Comm 5431. The Process of Persuasion. (3 cr. Prereq–3431) Communication campaigns (e.g., advertising, political) illustrating persuasive processes and theories. Research paper required.

Comm 5441. Communication in Human Organizations. (3 cr. Prereq–9 cr. social science, 3441 or #) Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

Comm 5451W. Intercultural Communication Processes. (3 cr) Theory and research on cultural differences in values, norms, behaviors, and perceptions that affect communication across cultures internationally and domestically.


Comm 5462. Field Research in Spoken Language. (3 cr. Prereq–Ling 3461, Ling 3001 or Ling 5001) Transcribing and analyzing verbal communication and movement related to it. Applying concepts to recorded conversations.


Comm 5617. History and Criticism of U.S. Public Discourse: 1630-1865. (3 cr. Prereq–#) How discourse has been used to establish or maintain power. Speeches and public debates used to examine American public address from 17th century (e.g., Puritan sermons) to the Civil War.

Comm 5618. History and Criticism of U.S. Public Discourse: 1865-1950. (3 cr. Prereq–#) How discourse has been used to establish or maintain power. Speeches and public debates used to examine U.S. public address from the mid 19th century to 1950.

Comm 5970. Directed Study. (1-3 cr [max 9 cr]; Prereq–#) Guided individual reading and study.

Comm 5994. Communication Research Practicum. (1-2 cr [max 9 cr]; S-N only. Prereq–#) Students participate in research group.
Course Descriptions

Computer Science (CSci)
Department of Computer Science

Institute of Technology

CSci 1103. Introduction to Computer Programming in Java. (4 cr)
Programming and problem-solving fundamentals. Significant portions of Java programming language. Students design/write Java programs relating to various subjects. Substantial programming projects, integral weekly lab.

CSci 1107. Introduction to FORTRAN Programming for Scientists and Engineers. (3 cr. Prereq–Math 1271 or Math 1271) Algorithm development and principles of computer programming using FORTRAN. Emphasizes numerical methods for science and engineering applications.


CSci 1121. Introduction to the Internet 1. (4 cr; A-F only)
Concepts of the internet, analog vs. digital communication, networking, packet switching, software protocols. E-mail, search engines, file transfer (ftp), remote login (Telnet). Creating Web pages using HTML and Cascading Style Sheets. Advanced programming concepts such as Java, Perl, and CGI.

CSci 1901. Structure of Computer Programming I. (4 cr. Prereq–Math 1271 or equiv 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. Prereq–1901 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 2103. Introduction to Numerical Computing. (4 cr. §CSci 5301. Prereq–Math 2243 or #) Introduction to numerical computing for CSci, mathematics, and science/engineering students. Uses Mathematica or Matlab to cover numerical error, root finding, systems of equations, interpolation, numerical differentiation and integration, least squares, and differential equations.

CSci 2121. Introduction to the Internet 2. (4 cr; A-F only. Prereq–1121) Programming for the Internet using HTML, JavaScript, and Perl. CGI, database programming with Perl. Database concepts such as relational vs. object-oriented database technologies, querying data using SQL. Interfacing databases to the Web. E-commerce, emerging trends such as XML.

CSci 2980. Special Topics in Computer Science. (1-4 cr. Prereq–Math 1271 or equiv or #) Special topics. Lectures, informal discussions.

CSci 3081W. Program Design and Development. (4 cr. §4081W #4089. Prereq–1902 or 2011 or #) Principles of programming design/analysis. Concepts in software development. Uses C/C++ language to illustrate key ideas in program design/development, data structures, OOP, files, I/O, state machines, testing, and coding standards.

CSci 3921W. Social, Legal, and Ethical Issues in Computing. (3 cr. Prereq–At least soph or #) Impact of computers on society. Computer science perspective of ethical, legal, social, philosophical, political, and economic aspects of computing.

CSci 3970. Industrial Student Co-op Assignment. (2 cr. Prereq–1121) Industrial work assignment in a co-op program involving advanced computer technology. Reviewed by a faculty member. Grade based on final written report.

CSci 3980. Undergraduate Colloquium. (1 cr. Prereq–Math 1271 or equiv or #) Current computing trends and hot topics; industrial and career related topics; research topics; research projects and undergraduate research opportunities; graduate school options.


CSci 4203. Computer Architecture. (4 cr. §4203. Prereq–EE 4483, EE 3361. Prereq–2011 or #) Introduction to computer architecture. Aspects of computer systems, such as pipelining, memory hierarchy, and input/output systems. Performance metrics. Examines each component of a complicated computer system.

CSci 4211. Introduction to Computer Networks. (3 cr. §4211. Prereq–4061 or #; basic knowledge of [computer architecture, operating systems] recommended, cannot be taken for grad cr) Concepts, principles, protocols, and applications of computer networks. Layered network architectures, data link protocols, local area networks, routing, transport, network programming interfaces, networked applications. Examples from Ethernet, Token Ring, TCP/IP, HTTP, WWW.

CSci 4707. Practice of Database Systems. (3 cr. §4707. Prereq–4041 or #) Concepts, conceptual data models, case studies, common data manipulation languages, logical data models, database design, facilities for database security/integrity, applications.

CSci 4921. History of Computing. (3 cr. §4921) Developments in 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]; A-F only. Prereq–Undergrad, #; no cr for grad in CSci) Lecture and informal discussions on current topics in computer science.

CSci 5013. Operating Systems. (3 cr. Prereq–4061 or #) Conceptual foundation of operating system designs and implementations. Relationships between operating system structures and machine architectures. UNIX implementation mechanisms as examples.

CSci 5106. Programming Languages. (3 cr. Prereq–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 5109. Visualization. (3 cr. Prereq–1902, 4041 or equiv or #) Fundamental theory/practice in data visualization. Emphasizes programming applications. Volume visualization, vector field visualization, information visualization, multivariate visualization, visualization of large datasets, visualization in immersive virtual environments, and perceptual issues in effective data representation. Projects are implemented in C++ using VTK or similar visualization API.