GRADUATE PROGRAMS

This is the Comparative Literature (cont.) through Educational Psychology program and course sections of the 1996-1999 University of Minnesota Graduate School Catalog

Curriculum—A major portion of coursework for degrees in comparative literature is offered by the literature and language departments. Approval may also be given, however, to take graduate courses in such areas as anthropology, art, architecture, history, music, philosophy, and sociology. In all cases, students should consult with an adviser concerning course selections.

Prerequisites for Admission—Although most students in the program have undergraduate majors in language or literature, applicants with other undergraduate backgrounds are considered.

Special Application Requirements—Applicants must submit scores from the Graduate Record Examination. The deadline for applying for admission and for financial aid is January 15. Admission is only for the following fall quarter.

Degree and Language Requirements—Consult the director of graduate studies for degree and language requirements.

For Further Information and Applications—Contact the Department of Cultural Studies and Comparative Literature, University of Minnesota, 350 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612/624-8099; fax 612/626-0228; http://www.grad.umn.edu/grad/dept/complit.html).

CLit 8666. Doctoral Pre-Thesis Credits. (max 18 cr per qtr; doctoral student who has not passed oral prelims)

CLit 8888. Thesis Credits: Doctoral. (36 cr required)

CLit 5147. Teaching As Dialogue. (4 cr) Sarles
Nature of teaching and of the teacher. Teaching authority; dynamics of Socratic dialogue and relation of teacher to students, to oneself; in present, toward students’ futures.

CLit 5165. Perspectives in Human Behavior. (4 cr) Sarles
Comparative basis for studying different disciplines, especially in behavioral sciences. Uses in-depth interviews of disciplinary practitioners to demonstrate nature of similarities, differences, and complementarities: integration and coherence vs. independence of disciplinary unities.

CLit 5221. Basic Concepts of Cinema. (4 cr) Mowitt
Tools and knowledge necessary to situate film in historical context, define major parameters of film theory, and introduce basic concepts of film analysis. Comparative study of French, English, and American theories.

CLit 5555. Introduction to Semiotics. (4 cr; offered when feasible) Sarles

CLit 5701. The Concept of Modernity. (4 cr; prerequisite reading knowledge of German or French or Spanish or #; offered alt yrs)
Concept of modernity as it unfolds in 19th century in works of Poe, Baudelaire, Nietzsche, Dostoevsky, and others and as reflected by contemporary theorists of language and literature.

CLit 5711. Sociocriticism. (4 cr; prerequisite 3xxx lit course or #) Introduction to sociological theories of literary discourse. Theoreticians such as Goldmann, Foucault, Bakhtin; application of theory to practice in readings of specific texts.

CLit 5910. Topics in Comparative Literature. (3-6 cr; prerequisite reading knowledge of French or German or Spanish or #)
Topics vary and include: English and American literature in China; John Donne’s Renaissance background; Joyce, Proust, and Mann; literature and ideas; medieval Latin literary texts; myth and ritual: the past redefined; the romantic novel; translation: theory and practice; the vanguard in Paris, 1900-1930.

CLit 5970. Directed Reading in Comparative Literature. (1-4 cr; prerequisite #, ∆, CLA approval)

CLit 8001-8002-8003†. Seminar in Comparative Literature. (4 cr per qtr) Introduction to sociological theories of literary discourse. Theoreticians such as Goldmann, Foucault, Bakhtin; application of theory to practice in readings of specific texts.

CLit 8125. On Discourse and Language. (4 cr) Sarles
Language as rhetorical, discursive, and dynamic phenomenon. What is a rhetorical grammar? What is the relation of language to human nature and question of nature in general sense? How language relates to human body, tone-of-voice phenomena.

CLit 8910-8920-8930. Advanced Comparative Literature Seminar. (4 cr; prerequisite 8001, 8002, 8003 or #)
Advanced seminar emphasizing the practical applications of specific methodologies and theories to a determined area. Topics vary.

CLit 8962. Modernism and Feminism. (4 cr)
Different paths that recognizable modernist and feminist discourses take in common project of negating and rewriting the past. Implications of these discourses’ (at times explosive) confrontation for understanding of fictional as well as theoretical texts.

CLit 8970. Directed Reading in Comparative Literature. (1-4 cr; prerequisite grad student in comparative literature, ∆)
Comparative Studies in Discourse and Society (CSDS)

Professor: Jackson P. Hershbell (Classical and Near Eastern studies); Richard D. Leppert (cultural studies and comparative literature); Helen E. Longino (women’s studies); Paula Rabinowitz (English); Jochen Schulte-Sasse (cultural studies and comparative literature; German); Hernán Vidal (Spanish and Portuguese) Jack D. Zipes (German)

Associate Professor: John Archer (cultural studies and comparative literature), director of graduate studies; Rita Copeland (English); Maria Damon (English); William W. Malandra (Classical and Near Eastern studies); Ellen Messer-Davidow (English); Roger P. Miller (geography); John W. Mowitt (cultural studies and comparative literature; English); Gianna Pomata (history); Gary C. Thomas (cultural studies and comparative literature); Jacquelyn N. Zita (women’s studies)

Assistant Professor: Lisette E. Josephides (anthropology); Katherine M. Solomonson (architecture)

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—M.A. (Plan B only) and Ph.D. Only students intending to pursue a Ph.D. in CSDS are admitted for either degree; the M.A. is a necessary step for the Ph.D.

Curriculum—The curriculum emphasizes small seminars and directed research. The core requirement is a three-quarter research seminar, a practicum that develops critical and analytic skills and introduces current theoretical perspectives with the study of historic problems. The majority of courses are offered on a nonrecurring basis and are closely related to current faculty research. For listings, students should consult the quarterly Class Schedule and fliers available in the department office. In all cases, students should consult their advisers and the director of graduate studies concerning course selections.

Prerequisites for Admission—Applicants to the master’s program are required to have a bachelor of arts degree in a humanities or social science discipline or other relevant field. Applicants to the doctoral program must have a master of arts degree or demonstrate evidence of adequate background and competence. Because the program involves broad, often interdisciplinary, courses of study and a variety of emphases, the graduate admissions committee carefully reviews each applicant’s background in terms of analytical skills, knowledge of subject matter, experience, language preparation, and especially, congruity with faculty interests and expertise.

Special Application Requirements—Scores from the General (Aptitude) Test of the Graduate Record Examination are required. The deadline for financial aid application is January 15 preceding the academic year for which aid is sought. Applications for admission are considered only at the January 15 deadline, except in certain cases for students already enrolled in a graduate degree program at the University of Minnesota. Consult the director of graduate studies for application requirements.

Master’s Degree Requirements—The master’s degree requires 44 quarter credits. All master’s students are required to take the three-quarter research seminar. The remaining credits are divided between seminars in the program and electives in other departments, chosen in consultation with the adviser and the director of graduate studies. Written and oral final examinations are required.

Doctoral Degree Requirements—The doctoral degree requires an additional 36 credits beyond the master’s degree. All doctoral students are required to take the three-quarter research seminar. The remaining credits are divided between seminars in the program and electives in other departments, chosen in consultation with the adviser and the director of graduate studies.

Language Requirements—Students must obtain a reading knowledge of one language other than English for the master’s degree and of two languages other than English for the doctoral degree, appropriate to individual research interests.

Minor Requirements for Students Majoring in Other Fields—Minor field requirements are 16 credits for the master’s program and 20 credits for the doctoral program. All minors must include at least two courses from the three-quarter research seminar sequence.

For Further Information and Applications—Contact the Comparative Studies in Discourse and Society Program, University of Minnesota, 350 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612/625-5358; e-mail csds@tc.umn.edu; http://www.grad.umn.edu/grad/dept/csdss.html).
CSDS 8666. Doctoral Pre-Thesis Credits. (max 18 cr per qtr; doctoral student who has not passed oral prelims)

CSDS 8888. Thesis Credits: Doctoral. (36 cr required)

CSDS 5711. Interpretation of Myth. (4 cr, §Hum 5711, §RelS 5111; prerequisite jr or sr or grad student) Structure and function of myths. Myth as social charter, ideological system, literary form. Readings in classic theories of myth and primary sources from India, Iran, Mesopotamia, Greece, Africa, North and South America.

CSDS 5910. Topics in Comparative Studies in Discourse and Society. (4 cr; prerequisite jr or sr or grad student) Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics vary quarterly.

CSDS 5970. Directed Studies. (Cr ar; prerequisite grad student, #) Guided individual reading or study.

CSDS 8001, 8002, 8003. Basic Research Seminar in Comparative Studies in Discourse and Society. (4 cr per qtr; prerequisite grad student, ∆) Year-long practicum focusing on such issues as interrelations of center and periphery in production and reception of discourse; role of discourse in struggles over social boundaries; power and formation of cultural constituencies. Theoretical readings and case studies.

CSDS 8404. International Hierarchy. (3 cr, §Pol 8404; prerequisite pol sci or CSDS grad student or #) Duvall asymmetric structures and processes of international relations; systematic conditions and implications of informal empire and structures of dependency and hegemony.

CSDS 8910. Advanced Topics in the Comparative Study of Discourse and Society. (4 cr; prerequisite grad student) Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics vary quarterly.

CSCL 5102. Cultural Politics
CSCL 5154. Theoretical Constructions of Space
CSCL 5178. The Political Discourse of Change
CSCL 5256. Suburbia
CSCL 5301. Society, Ideology, and the Production of Art

CSCL 5302. Aesthetics, Ideology, Valuation of Art
CSCL 5398. Phenomenology and Ethnography
CSCL 5751. Basic Concepts of Cinema
CSCL 5910. Topics in Cultural Studies and Comparative Literature

Composition, Literacy, and Rhetorical Studies

Professor: Christopher M. Anson (English); Richard W. Beach (curriculum and instruction); Lillian S. Bridwell-Bowles (English); Karlyn K. Campbell (speech-communication); Andrew D. Cohen (linguistics); Terence G. Collins (General College); Alan G. Gross (rhetoric); Michael Hancher (English); Dale L. Lange (curriculum and instruction); Mary M. Lay (rhetoric); Earl E. McDowell (rhetoric); Donald J. Ross, Jr. (English); Robert L. Scott (speech-communication); Elaine E. Tarone (linguistics); Barbara M. Taylor (curriculum and instruction); Paulus W. van den Broek (educational psychology); Billie J. Wahlstrom (rhetoric)

Associate Professor: Robert L. Brown, Jr. (English), director of graduate studies; Lisa Albrecth (General College); Rita Copeland (English); Ann H. Duin (rhetoric); Amy L. Sheldon (speech-communication); Geoffrey M. Sirc (General College); Diane J. Tedick (curriculum and instruction); Constance L. Walker (curriculum and instruction); Arthur E. Walzer (rhetoric)

Assistant Professor: Laura J. Gurak (rhetoric)

Course of Study—Minor in composition, literacy, and rhetorical studies, applicable to doctoral programs.

Curriculum—Students develop a program of study in consultation with their major adviser (preferably one of the faculty above), the director of graduate studies in their major, and the director of graduate studies in composition, literacy, and rhetorical studies (CLRS).

Prerequisites for Admission—Admission to the CLRS graduate minor is contingent upon prior admission to a doctoral degree-granting program within the Graduate School.

Special Application Requirements—Admission is competitive and restricted to a number that will allow for a quality experience. Entrance to the minor is granted only by permission of the director of graduate studies in CLRS and the faculty selection committee. Application materials include a completed application form, statement of goals, teaching
portfolio, curriculum vitae, and two letters of recommendation addressing the teaching component. The deadline for all application materials is March 15 for the following fall quarter. Applications received after that date are considered as space allows.

Minor Requirements—The minor requires a minimum of 20 credits (five or six courses). Only one course can be from the student’s home department; of the remaining courses at least one course should come from each of the following four categories: seminar in a theoretical topic, seminar or course in pedagogical theory and practice, seminar or course in research methods and practices, and a capstone writing seminar.

Language Requirement—None specific to the minor program.

For Further Information and Applications—Contact the Center for Interdisciplinary Studies of Writing, University of Minnesota, 227 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612/626-7579; fax 612/626-7580; e-mail micha013@tc.umn.edu; http://cisw.cla.umn.edu/gradstu/compminor).

Computer and Information Sciences (CSci)

Professor: Ahmed Sameh, head; Frederic N. Bailey; Gordon B. Davis; David H. Du; Ding-Zhu Du; David W. Fox; Laël C. Gatewood; Paul E. Johnson; Michael B. Kac; Richard Y. Kain; Daniel J. Kersten; Larry L. Kinney; K. S. P. Kumar; Vinip Kumar; E. Bruce Lee; Arthur L. Norberg; Linda R. Petzold; Marian B. Pour-El; J. Ben Rosen (emeritus); Youcef Saad; Eugene B. Shragowitz; James R. Slagle; Marvin L. Stein; Wei-Tek Tsai; Hans F. Weinberger; Paul R. Woodward; Pen-Chung Yew

Associate Professor: Daniel L. Boley; John V. Carlis; Vladimir Cherkassky; Krzysztof S. Frankowski; Maria Gini; Larry G. Hutchinson; Ravi Janardan; David J. Lilja; J. David Naumann; Matthew T. O’Keefe; Nikolaos P. Papanikolopoulos; Haesun Park; John T. Riedl; Shashi Shekhar; Gerald E. Sobelman; Jaideep Srivastava; Anand R. Tripathi

Assistant Professor: Shantanu Dutt; Joseph A. Konstan; Gyungho Lee; Zhiyuian Li; Basra Mohasser; Shang-Hua Teng; Bapiraju Vinnakota

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—M.S. (Plan A and Plan B), M.C.I.S., and Ph.D.

Curriculum—The faculty of the Department of Computer Science conducts research in a broad spectrum of the computer sciences and interdisciplinary fields. Graduate students may pursue research and study with faculty on topics such as theory of computation and algorithms, numerical algorithms and software for supercomputer and parallel machines, languages and compilers, systems, artificial intelligence, computer and system design, computer-aided design, software engineering, and history of computing. In addition, students may choose a course of study that combines a portion of one of these major areas with an entirely different field.

Graduate students have access to today’s most powerful supercomputers through the Minnesota Supercomputer Center. In addition, Computer and Information Services provides an integrated computing environment ranging from microcomputers to workstations to large mainframe computing equipment. The Department of Computer Science also provides computing facilities through its various laboratories, such as the Instructional Laboratory, the Software Engineering Laboratory, the Artificial Intelligence Laboratory, the High Performance and Computing Laboratory, and the Distributed Systems Laboratory.

Prerequisites for Admission—A degree in any major with a substantial background in mathematics and basic core computer science is required; a computer science major is preferred. Applicants with an inadequate background must remove any deficiencies before beginning their degree program.

Special Application Requirements—Three letters of recommendation are required. Scores from the General (Aptitude) Test of the Graduate Record Examination (GRE) are required from M.S. and Ph.D. program applicants. The Subject Test is optional, although highly recommended, especially for those seeking financial assistance. If taken, it should be in the undergraduate major field or, if it is not offered in that field, in computer science, mathematics, or engineering. The department accepts new master’s and Ph.D. students for fall admission only. The application deadline is May 31. Students seeking financial aid must apply by January 2.
Before applying, M.C.I.S. students must have the equivalent of six months full-time computer-related industrial experience in the United States.

**Master of Science (M.S.) Degree Requirements**—All courses taken from the Department of Computer Science must be taken A-F, unless they are offered S-N only. Courses in other departments may be taken S-N. The total number of credits taken S-N cannot exceed one third of the total credits in your program. In addition to general Graduate School requirements, all M.S. students must demonstrate competence in the basic material through a final oral examination.

**Master of Computer and Information Sciences (M.C.I.S.) Degree Requirements**—This program is designed for the working professional. Students must complete a minimum of 44 quarter credits in graduate courses with a minimum of 28 credits in the major. All courses taken from the Department of Computer Science must be taken A-F, unless they are offered S-N only. Courses in other departments may be taken S-N. The total number of credits taken S-N cannot exceed one third of the total credits in your program.

**Doctoral Degree Requirements**—Doctoral students must take the written preliminary examination as outlined in the departmental student handbook. All courses taken from the Department of Computer Science must be taken A-F, unless they are offered S-N only. Courses in other departments may be taken S-N. The total number of credits taken S-N cannot exceed one third of the total credits in your program.

**Language Requirements**—None.

For Further Information and Applications—Contact the Department of Computer Science, University of Minnesota, 4-192 Electrical Engineering/Computer Science Building, 200 Union Street S.E., Minneapolis, MN 55455 (612/625-4002; fax 612/625-0572; e-mail dgs@cs.umn.edu; http://www.cs.umn.edu).

**CSci 5090. History of Computing.** (4 cr, §HSci 5321) Developments in the last century: evolution of hardware and software, growth of the industry and its relation to other business areas, and changing relationships resulting from new data-gathering and analysis techniques.

**CSci 5101. Introduction to the Organization of Computer Systems.** (4 cr, §3107, §3327; prereq non-CSci major, 3121 or 3316 or #) Organization of hardware and software systems that support computer programming and program execution. Symbolic assembly language to study mapping of application programs and data into underlying hardware. Ideas illustrated in assembly language (currently Motorola 680x0).

**CSci 5102. Introduction to Systems Programming.** (4 cr; prereq 3327, 5101 or #; no grad cr for CSci majors; informal lab) User-level programming view of operating system functions; introduction to UNIX systems programming; use of system calls, relationships between C library functions and systems calls, file systems, process management functions, input-output, signal handling, use of pipes and sockets, and shell programming.

**CSci 5103. Introduction to Operating Systems.** (4 cr, §5502; prereq 3322, 5102, 5201 or #; informal lab) Conceptual foundations used in operating system design and implementation; relationship between operating system structure and underlying machine architecture; UNIX implementation mechanisms used as example.

**CSci 5104. System Simulation: Languages and Techniques.** (4 cr; prereq 3327 or 5101, Stat 3091 or #; informal lab; offered alt yrs) Methodologies relevant to system modeling and simulation. Application of stochastic process, Markov chains, and queuing theory to developing system models and designing simulation experiments. Data collection and statistical analysis of output. Fundamentals of discrete event-based simulations using digital computers. Simulation languages, both process- and event-oriented, including SIMULA and SIMPAS. Applications of these techniques to job shops, operations research, and modeling of computer and communications systems.

**CSci 5106. Structure of Higher Level Languages.** (4 cr; prereq 3317, 3321, 3327 or #; no grad cr for CSci majors) Motivation, syntax and semantics, imperative languages (e.g., Ada, C), type system, control structures, procedures, activation record model, exception handlers; encapsulation, parameterization; functional languages (e.g., Lisp, Scheme, ML, FP); object-oriented languages (e.g., Smalltalk, C++, CLOS); trends (e.g., concurrent model).

**CSci 5107. Computer Graphics I.** (4 cr; prereq 3322, 3327 or #) Extensive programming; theoretical underpinnings of computer graphics. General graphics issues, user interface issues, 2D graphics, and introduction to 3D graphics, including 3D pipeline, shading and hidden surface removal, and ray tracing.
CSci 5110. User Interface Design, Implementation, and Evaluation. (4 cr; prereq 3322, 3327 or #; informal lab)
Designing, programming, and evaluating interactive applications, with focus on task-centered approaches to user interface design. Designing, prototyping, evaluating, and implementing an application interface. Interface evaluation techniques, including user testing and non-user walk-through and heuristic techniques.

CSci 5111. GUI Toolkits and Their Implementation. (4 cr; prereq 5107 or 5110 or #; informal lab)
Structure and design of user interface toolkits and frameworks. Window system protocols, toolkit design, event processing, data management and constraints, geometry management, resource management, and other features of advanced interface development toolkits. Students implement a toolkit extension or widget.

CSci 5113. Introduction to Object-Oriented Programming Using C++. (4 cr, §3121, §3321, §3322; prereq C language programming equiv to 3113; no grad cr for CSci majors)
Object-oriented programming; inheritance, including polymorphism and multiple inheritance; container classes and iterators; operator overloading, user-defined implicit conversions, constructors, destructors, and templates.

CSci 5117. Computer Graphics II. (4 cr; prereq 5107 or #; informal lab)
Spline curves and surfaces and other advanced modeling techniques, solid modeling, color theory, advanced shading algorithms, advanced ray tracing, radiosity, introduction to scientific visualization.

CSci 5121. Algorithms and Data Structures II. (4 cr, §3322; prereq 3311, non-CSci major; 3322 recommended for CSci majors)
Fundamental paradigms for algorithm design with supporting data structures. Complexity, correctness analysis, and lower bound theory. Implementation of selected algorithms and data structures using C++ language.

CSci 5151. Introduction to Parallel Computing. (4 cr; prereq 3121 or 3322 or #)

CSci 5161. Introduction to Compilers. (4 cr, §5504; prereq 5106 or #; informal lab)
Techniques for implementing programming languages; compiler front end, recognizing syntactic structures, generating internal representations; symbol table manipulation and type checking.

CSci 5180. Software Engineering I. (4 cr; prereq 5106 or #; informal lab)

CSci 5181. Software Engineering II. (5 cr; prereq 5180; scheduled lab)
Requirements analysis. Project planning and management. Design reviews, software testing, validation strategies. Maintenance. Student groups specify, design, implement, and test partial software systems. Emphasis on application of general software development methods and principles from 5180.

CSci 5199f,w,s. Problems in Languages and Systems. (1-4 cr [may be repeated for cr]; prereq #)
Special courses or individual study arranged with faculty member.

CSci 5201. Computer Architecture. (4 cr; prereq 3327 or #; no grad cr for CSci majors; informal lab)
Elementary computer architecture, gates and digital logic, register transfers and micro-operations, processor studies of existing systems.

CSci 5205. Parallel Computer Architecture. (4 cr; prereq 5201 or #; offered alt yrs)
Parallel computer system analysis and design; organizational dependence on computations to be performed; primary components of parallel architectures (processors, control units, memories, interconnection networks); implemented paradigm of pipelined and vector processors, array processors, and multiprocessors.

CSci 5211. Data Communications and Computer Networks. (4 cr; prereq 5102 or #; informal lab)
Network classification and services. Hardware components: multiplexors, concentrators, communications media. Network protocols and architectures. Research areas.

CSci 5212. Network Programming. (2 cr; prereq 5102, 51211 or #; no grad cr for CSci majors)
Network and distributed programming concepts using C++ and UNIX, including TCP/IP, sockets, and RPC applications.

CSci 5221. Advanced Computer Networks and Their Applications. (4 cr; prereq 5211 or #)
Design, maintenance, and use of high-speed networks and their impact on society. Emphasizes new emergent protocols, such as FDDI-11, Frame-Relay, ATM. Characteristics of hardware, protocols, and applications such as high performance distributed computing and multimedia.
GRADUATE PROGRAMS

CSci 5222. Network Operations and Administration. (4 cr; prereq 5211 or #; no grad cr for CSci majors)

CSci 5280. Computer-Aided Design I. (4 cr; prereq 3311 or #; informal lab)
CAD for digital systems with emphasis on VLSI. Hardware description languages: synthesis, simulation, test generation.

CSci 5281. Computer-Aided Design of VLSI. (4 cr; prereq 3311 or #; informal lab)
CAD for digital systems with emphasis on VLSI. Physical design: partitioning, placement and routing, design rule checks, electrical rule checks. Inherent complexity of algorithms. Analysis of best known algorithms.

CSci 5299f,w,s. Problems in Machine Design. (1-4 cr [may be repeated for cr]; prereq #)
Special courses or individual study arranged with faculty member.

CSci 5301. Numerical Computation. (4 cr; prereq Math 3261, knowledge of a programming language or #; no grad cr for CSci majors; informal lab)

CSci 5302. Analysis of Numerical Algorithms. (4 cr; prereq 5301 or #)

CSci 5304. Computational Aspects of Matrix Theory. (4 cr; prereq 5302 or #; informal lab)

CSci 5305. Numerical Methods for Ordinary Differential Equations. (4 cr; prereq 5302 or #; informal lab)

CSci 5306. Numerical Methods for Partial Differential Equations. (4 cr; prereq 5302, differential equations or advanced calculus)

CSci 5320. Introduction to Linear Programming. (4 cr, §5001; prereq 5301 or #; informal lab)
Basic solutions to linear systems: inequalities; convex polyhedral sets; linear programming formulation and optimality conditions; theoretical and computational aspects of simplex algorithm; postoptimal analysis; duality. Revised simplex and numerically stable methods, upper-bounded problems; commercially available LP systems; methods for large, sparse systems. Interior methods for LP.

CSci 5399f,w,s. Problems in Numerical Analysis. (1-4 cr [may be repeated for cr]; prereq #)
Special courses or individual study arranged with faculty member.

CSci 5400. Introduction to Automata Theory. (4 cr; prereq 3311 or #; no grad cr for CSci majors)
Turing machines, computable functions, unsolvability of the halting problem, recursive functions. Finite state models: equivalence, minimization, properties, decision questions, characterizations. Regular expressions. Survey of other automata.

CSci 5421. Introduction to Algorithm Design. (4 cr, §8401; prereq 3322 or 5121 or #)
Divide-and-conquer, dynamic programming, the greedy method, matroids, backtracking and branch-and-bound, basic graph algorithms, techniques for geometric problems, and string matching.

CSci 5422. Advanced Data Structures. (4 cr, §5122; prereq 3322 or 5121 or #)
Techniques for representing and manipulating data efficiently and for analyzing performance of these methods. Priority queues, balanced search trees, multidimensional searching structures, amortized complexity and its applications to data structure design, persistent data structures, and data structures for secondary storage.

CSci 5442. Introduction to Computational Geometry. (4 cr; prereq 5421 or #)
Techniques for design and analysis of geometric algorithms. Geometric problems that occur naturally in applications such as computer graphics, solid modeling, CAD, robotics, manufacturing, vision. Pure and applied aspects of geometric computation.

CSci 5499f,w,s. Problems in Computational Theory or Logic. (1-4 cr [may be repeated for cr]; prereq #)
Special courses or individual study arranged with faculty member.
CSci 5511. Artificial Intelligence I. (4 cr; prereq 3322 or #; informal lab)
Introduction to ideas, issues, and applications of artificial intelligence. Knowledge representation, problem solving, search, inference techniques, theorem proving. Expert systems. Artificial intelligence programming languages.

CSci 5512. Artificial Intelligence II. (4 cr; prereq 5511 or #; informal lab)

CSci 5521. Pattern Recognition. (4 cr; prereq 5301, Stat 3091 or #; informal lab)

CSci 5531. Artificial Intelligence Programming Techniques. (4 cr; prereq 5511 or #; informal lab; offered alt yrs)
Languages and programming techniques for problems in artificial intelligence. Lisp and Prolog. Production system and frame-based languages. High level tools. Implementation of knowledge representation structures and inference operations. Applications in expert systems.

CSci 5551. Introduction to Intelligent Robotic Systems. (4 cr; prereq 5511 or #)
Fundamentals of robot manipulator operations. Sensing techniques and their basic principles. Real-time programming issues as applied to control of robots. Robot programming and planning.

CSci 5561. Computer Vision. (4 cr; prereq 5511 or #)

CSci 5571. Expert Systems. (4 cr; prereq 5511 or #)
Aspects of artificial intelligence representations and inferencing mechanisms as applied to expert systems. Students develop small expert system.

CSci 5599. Problems: Artificial Intelligence. (1-4 cr per qtr [may be repeated for cr]; prereq #)
Special courses or individual study arranged with faculty member.

CSci 5702. The Principles of Database Systems. (4 cr; prereq 3322 or #; informal lab)

CSci 5703. Database System Design. (4 cr; prereq 5702 or #; informal lab)
Application of database concepts in design and development of database systems and applications. Design of current commercial as well as research-oriented database systems. Techniques of using database systems for applications.

CSci 5705. Object-Oriented Databases. (4 cr; prereq 5702 or #)
Applications and motivation; extended relational, object-relational, and object-oriented data models; object identifier, types, and constructors; versions and schema evolution; query language (e.g., recursion, path expressions); object indices, buffer management, and other implementation issues; triggers, rules, complex objects, and case studies.

CSci 5799. Problems: Information Science. (1-4 cr per qtr [may be repeated for cr]; prereq #)
Special courses or individual study arranged with faculty member.

CSci 5863. Computer Systems Performance Analysis. (4 cr, §EE 5863; prereq grad IT major, 5201 or EE 5858 or #; offered alt yrs)
Tools and techniques for measuring and analyzing computer hardware, software, and system performance. Benchmark programs, measurement tools, performance metrics. Presenting data, summarizing measured data, comparing system performance. Deterministic and probabilistic simulation techniques, random number generation and testing. Bottleneck analysis.

CSci 8101. Advanced Operating Systems. (3 cr; prereq 5103, 5211 or #)

CSci 8102. Operating Systems Theory. (3 cr; prereq 5103, 5104 or #)

CSci 8103. Distributed and Parallel Programming. (3 cr; prereq 5103, 8101 or #)

CSci 8110. Human-Computer Interaction and User Interface Technology. (3 cr; prereq 5110 or 5111 or #)
Research issues in HCI, UI toolkits and frameworks, and other areas of UI technology. HCI research techniques, model-based UI development, gesture-based interfaces, interface development by demonstration, constraint-based programming, event processing models, innovative UI systems, and UI technology and HCI issues in multimedia systems.
CSci 8161. Advanced Compiler Techniques. (3 cr, §§5505; prereq 5102, 5201, grad IT major or #)
Back end compiler techniques for generating efficient uniprocessor machine code; effect of modern architecture features on code generation; basic block and global dataflow analysis; machine independent optimizations; register allocation; instruction scheduling for efficient instruction pipeline and superscalar and VLIW operations; data locality enhancement; interprocedural analysis.

CSci 8163. Compiler Techniques for Parallel Architectures. (3 cr; prereq 8161, grad IT major or #)
Compiler techniques for generating efficient parallel machine code; effect of modern parallel architecture features on code generation; parallelism extraction by data dependence analysis and data flow analysis; data locality enhancement and memory latency hiding; static and dynamic scheduling of parallel tasks; program transformations; interprocedural analysis.

CSci 8180. Advanced Software Engineering. (3 cr; prereq 5180 or #)
Selected research topics, including software development and maintenance techniques for real-time, safety-critical applications; object-oriented analysis and design techniques; reengineering legacy code; automated requirement acquisition; multimedia applications; software fault-tolerant techniques; software testing.

CSci 8203. Advanced Computer Architecture. (3 cr, §§5205, §EE 8362; prereq 5201 or #)
High-speed uniprocessor design: Amdahl’s Law; static (VLIW) and dynamic (scoreboarding, Tomasulo’s algorithm, multithreading) instruction scheduling techniques; multiple instruction issue (superscalar) architecture; pipelining and pipeline design; vector units, interrupts, and interrupt handling; branch handling strategies; performance evaluation and benchmarking.

CSci 8205. Parallel Computer Organization. (3 cr, §EE 8363; prereq 5201 or #)
Parallel computer organization and architecture; shared and distributed memory architectures; synchronization techniques; static and dynamic scheduling; hardware/software interaction in parallel systems; parallel system software and compilers; example parallel machines and performance evaluation.

CSci 8221. Special Research Topics in Computer Networking. (3 cr; prereq 5211 or #)
Topics in high-speed networking, including ATM, HIPPI, Fibre Channel, and optical networks; protocol design, routing and flow control for high-speed networks; management and security issues.

CSci 8305. Computational Methods for Differential-Algebraic Equations. (3 cr; prereq 5305 or #)
Numerical methods for differential-algebraic equations (DAEs). Solvability, index, order and stability for numerical methods, software, delays, boundary value problems, and applications.

CSci 8314. Iterative Methods for Linear Systems. (3 cr; prereq 5304; offered alt yrs)

CSci 8320. Numerical Solution of Linear Least Squares Problems. (3 cr; prereq 5304 or #; offered alt yrs)

CSci 8350. Advanced Parallel Numerical Methods. (3 cr, §§5307, §§8307; prereq 5301, 5151 or #)
Parallel solution of dense and banded linear systems; eigenvalue techniques for tridiagonal and dense matrices; Cuppen’s and Jacobi’s methods; FFT and fast Poisson solvers; basic iterative methods (e.g., over-relaxation, alternating direction implicit, multigrid); domain decomposition techniques.

CSci 8360. Numerical Linear Algebra in Dynamical Systems. (3 cr; prereq 5304 or #)
Computational methods in linear algebra; matrix decomposition for linear equations, least squares, eigenvalue and generalized eigenvalue problems, conditioning and stability; state space methods in dynamical systems; controllability, poles, zeros, Lyapunov and Riccati equations; norms of dynamical systems and model reduction.

CSci 8403-8404. Theory of Computation. (3 cr per qtr; prereq 5400 or equiv or #; offered alt yrs)

CSci 8421. Advanced Algorithm Design. (3 cr, §§5402; prereq 5421 or #)
Linear programming; advanced graph and geometric approximation, on-line, and randomized algorithms.

CSci 8521. Neurocomputing and Neural Networks. (3 cr; prereq 5511)
Learning laws, associative networks, mapping networks, backpropagation, overfitting and generalization, complexity of learning, self-organizing maps; current topics such as optimization via boltzman networks, spatio-temporal networks, physiological networks, efficient implementations on parallel computers.

CSci 8551. Artificial Intelligence Techniques in Robotics. (3 cr; prereq 5512 or # informal lab)
Representation of physical world and reasoning over world models. Complex modeling, representation of physical properties, uncertainty. Qualitative and quantitative reasoning techniques. Use of knowledge bases, reasoning about space, reasoning with geometry, reasoning with time. Program synthesis, plan formation, error recovery.
CSci 8561. Readings in Computational Vision. (3 cr; prereq 5561 or #; offered alt yrs)
Classic papers and recent results relating to computational models of vision and other perceptual systems.

CSci 8571. Readings in Expert Systems. (3 cr; prereq 5571 or #; offered alt yrs)
Classic papers and recent results relating to expert systems and computational models of expert problem solving.

CSci 8581. Readings in Parallel Symbolic Computing. (3 cr; prereq 5512 or #; offered alt yrs)
Exploiting parallelism in symbolic applications with special emphasis on problems related to artificial intelligence. Parallel search, parallel execution of expert systems. Parallel algorithms for natural language, vision, neural networks.

CSci 8701. Overview of Database Research. (3 cr; prereq 5703 or #)
Methodologies, relational implementation techniques, active databases, storage systems, benchmarking, distributed and parallel databases, new data models, prototype systems, vision and future directions.

CSci 8703. Distributed and Parallel Databases. (3 cr; prereq 5703 or #)
Distributed DBMS architecture, including client-server, distributed DB design, distributed query optimization and processing; distributed transaction management (concurrency control and recovery); federated/multibases definition and issues; database machines (concepts, successes, and failures); parallel databases.

CSci 8705. Scientific Databases and Applications. (3 cr; prereq 5702 or #)
Scientific applications and data management; image data and operations; databases and data blades; database research issues and survey from an application domain such as geographical information systems, environmental studies, molecular biology, or neuroscience.

CSci 8760. Plan B Project. (3 cr [may be taken once to satisfy Plan B master’s requirement, may appear on master’s program, but may not be applied toward 20 cr minimum in major field]; prereq CSci MS student, # S-N only)
Project topic(s) arranged between student and adviser. Written report(s).

Note—All of the following seminars may be presented as either lectures or as individually assigned readings in the current literature. The amount of credit earned is arranged with the faculty member. Seminars may be repeated for credit when topics change.

CSci 8199. Seminar: Languages and Systems. (1-3 cr; prereq #)

CSci 8299. Seminar: Machine Design. (1-3 cr; prereq #)

CSci 8399. Seminar: Numerical Analysis. (1-3 cr; prereq #)

CSci 8499. Seminar: Computational Theory and Logic. (1-3 cr; prereq #)

CSci 8599. Seminar: Artificial Intelligence. (1-3 cr; prereq #)

CSci 8799. Seminar: Information Science. (1-3 cr; prereq #)

Other Acceptable Courses
In addition to the courses offered by the Department of Computer Science that are listed above, the following courses, taught by members of the graduate faculty in computer science, may be applied to the major.

EE 5852-5853. Computer Organization and Design I-II
Math 5162-5163-5164. Mathematical Logic
Math 8140-8141-8142. Applied Logic
Math 8181-8182-8183. Formal Languages and Automata
Math 8190-8191-8192. Topics in Logic
Psy 5036. Vision: Computational Theory to Neural Systems

Computer Engineering

Professor: David H.-C. Du; Larry L. Kinney; Vipin Kumar; Ahmed Sameh; Eugene B. Shragowitz; Wei-tek Tsai; Pen-Chung Yew

Associate Professor: David J. Lilja, director of graduate studies; Vladimir Cherkassky; Matthew T. O’Keefe; Gerald E. Sobelman; Shashi Shekhar; Jaideep Srivastava

Assistant Professor: Zhiyuan Li; Lori Lucke; Bapiraju Vinnakota

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—M.S. (Plan A and Plan B) and M.Comp.E. (coursework only).

Curriculum—Computer engineering is an interdisciplinary graduate program offered jointly by the Department of Electrical Engineering and the Department of Computer Science. Students in this program develop a broad understanding of both hardware and software design issues. The M.S. degree is a traditional research-oriented graduate degree that prepares graduates to work in industry or to continue with their graduate studies in either electrical engineering or computer and information sciences. The M.Comp.E. degree is a coursework-only professional engineering degree tailored primarily for working professionals.
Access to a wide variety of computational and laboratory equipment is provided through the Departments of Electrical Engineering and Computer Science. Students can focus their studies in several different areas, including computer architecture and system design, compilers, computer-aided design, databases, networks, operating systems, parallel computing, software engineering, and VLSI design and testing.

Prerequisites for Admission—Graduate study in computer engineering is open to students with an undergraduate degree in computer engineering, electrical engineering, computer science, or a closely related field, such as mathematics or physics. In some instances, additional preparatory work may be required after admission.

Special Application Requirements—All applicants are required to submit three letters of recommendation. Scores from the Graduate Record Examination General Test are required of all students seeking financial aid. Applicants whose native language is not English must also submit TOEFL scores.

Degree Requirements—In addition to the Graduate School requirements, all graduate programs in computer engineering require a core program of courses in system software, computer architecture and networking, VLSI and digital design, and data structures and algorithms, with a minimum of 6 credits from electrical engineering and 6 credits from computer and information sciences. The comprehensive final exam for the M.S. degree is oral; no final exam is required for the M.Comp.E. degree.

Minor Requirements for Students Majoring in Other Fields—There is no designated minor available in computer engineering.

Language Requirement—None.

For Further Information and Applications—Contact the Graduate Program in Computer Engineering, University of Minnesota, 4-178 Electrical Engineering/Computer Science Building, 200 Union Street S.E., Minneapolis, MN 55455 (612/625-3300; fax 612/625-4583; e-mail gradinfo@compengr.umn.edu).

CmpE 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)

The following courses can be applied to the major field credit requirements:

- CSci 5103. Introduction to Operating Systems
- CSci 5104. System Simulation: Languages and Techniques
- CSci 5106. Structure of Higher Level Languages
- CSci 5151. Introduction to Parallel Computing
- CSci 5161. Introduction to Compilers
- CSci 5180-5181. Software Engineering I-II
- CSci 5201/EE 5858. Computer Architecture
- CSci 5211. Data Communications and Computer Networks
- CSci 5280. Computer-Aided Design I
- CSci 5281. Computer-Aided Design of VLSI
- CSci 5421. Introduction to Algorithm Design
- CSci 5422. Advanced Data Structures
- CSci 5702. The Principles of Database Systems
- CSci 5703. Database System Design
- CSci 5705. Object-Oriented Databases
- CSci/EE 5863. Computer Systems Performance Analysis
- CSci 8101. Advanced Operating Systems
- CSci 8102. Operating Systems Theory
- CSci 8103. Distributed and Parallel Programming
- CSci 8161. Advanced Compiler Techniques
- CSci 8163. Compiler Techniques for Parallel Architectures
- CSci 8180. Advanced Software Engineering
- CSci 8203/EE 8362. Advanced Computer Architecture
- CSci 8205. Parallel Computer Organization or EE 8363. Parallel Processing I
- CSci 8221. Special Research Topics in Computer Networking
- CSci 8421. Advanced Algorithm Design
- CSci 8521. Neurocomputing and Neural Networks or EE 8359. Computing with Neural Networks
- CSci 8701. Overview of Database Research
- CSci 8703. Distributed and Parallel Databases
- CSci 8705. Scientific Databases and Applications
- EE 5571-5572-5573. VLSI Design I-II-III
- EE 5574-5575. Computer-Aided VLSI Design Laboratory
- EE 5576. VLSI Modeling and Processing
Conflict Management

Professor: Mario F. Bognanno (industrial relations); Eugene Borgida (psychology); Paul V. Ellefson (forest resources)
Assistant Professor: Mark S. Umbreit (social work)

Course of Study—Minor in conflict management, applicable to master’s (M.A. and M.S.) and doctoral programs.

Curriculum—Conflict management is a recently recognized and rapidly advancing area of inquiry that is concerned with the study of the origin, process, and management of conflict interactions among individuals, groups, organizations, and systems, and the impact of these interactions. It is an interdisciplinary effort with roots in economics, family studies, industrial relations, law, political science, primary communication, psychology, public policy, social work, and other departments.

Prerequisites for Admission—Admission to the graduate minor in conflict management is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School.

Special Application Requirements—None.

Minor Requirements—The minimum number of graduate-level quarter credits for the minor at the master’s level is 11 and at the doctoral level is 21. The program for an individual student is developed in consultation between the student, the major adviser, and the director of graduate studies in conflict management. A sequence of three required core courses in conflict management theory and practice is chosen, one each from the following pairs: SW 5026 or Spch 5407; IR 5002 or PA 5114; and IR 8027 or Law 5833.

Language Requirements—None specific to the minor program.

For Further Information and Applications—Contact the Director of Graduate Studies, Graduate Minor in Conflict Management, Conflict and Change Center, University of Minnesota, Humphrey Center, 301 19th Avenue South, Minneapolis, MN 55455 (612/625-0362; fax 612/625-3513; e-mail conflmin@tc.umn.edu).

Core Courses

IR 5002. Systems of Conflict and Dispute Resolution (Azevedo)
IR 8027. Dispute Resolution Practices: Mediation, Fact Finding, and Arbitration
Law 5833. Alternative Dispute Resolution (see Law School Bulletin for complete description)
PA 5114. Conflict Management: Theory and Practice (Fiutak)
PA 5966. Application of Mediation Methods (Fiutak)
Spch 5451. Intercultural Communication (Albert)
SW 5026. Mediation and Conflict Resolution

Elective Courses

The following is an illustrative, not exhaustive, list of potential elective courses. With the permission of the director of graduate studies, students may elect courses other than those listed below in fulfillment of the degree requirements. (See the Law School Bulletin for complete descriptions of the Law courses listed below.)

Anth 5116. Ecological Anthropology (Gerlach)
Anth 5152. Anthropology of Social Movements (Gerlach)
Econ 5107H. Honors Course: Game Theory and Its Applications (McLennan)
Econ 8117, 8118. Noncooperative Game Theory (McLennan)
EPsy 5154. Organizational Development and Change (J. ohnson)
EPsy 8150. Psychology of Conflict Resolution (J. ohnson)
IR 8004. Design and Management of Organizations for a Changing World
IR 8007. Collective Bargaining: Private and Public Sectors
IR 8017. Labor Movements in a Changing World (Budd)
IR 8024. Organization Design and Change (Wang)
IR 8032. Comparative and International Labor Movements (Scoville)
IR 8037. Labor-Management Negotiations (Budd)
Jour 8651. Seminar: Mass Media and Social Change
Law 5820. Labor Arbitration (Cooper)
Mgmt 8050. Innovation and Change (Van de Ven)
Psy 5702. Individual Behavior in Organizations (Kanfer)
Soc 5211. Social Processes in Small Group Settings (Leik)
Soc 5311. Sociology of Conflict (Cooperman)
Soc 5411. Formal Organizations
Spch 5452. Intercultural Interaction: Theory and Application (Albert)
Spch 8421. Seminar: Communication and Negotiation
Spch 8451. Face to Face Intercultural Communication (Albert)
Spch 8452. Facilitating Intercultural Communication (Albert)
SW 8350. Planned Social Change (Umbreit)

**Conservation Biology (CBio)**

*Regents' Professor:* Margaret B. Davis (ecology, evolution, and behavior)

*Professor:* Donald B. Siniff (ecology, evolution, and behavior), director of graduate studies; Dean E. Abrahamson (public affairs); Franklin H. Barnwell (ecology, evolution, and behavior); Marvin E. Bauer (forest resources); Elmer C. Birney (Bell Museum of Natural History; ecology, evolution, and behavior); Charles R. Blinn (forest resources); Kenneth N. Brooks (forest resources); Dwight A. Brown (geography); Vernon B. Cardwell (agronomy and plant genetics); Kendall W. Corbin (Bell Museum of Natural History; ecology, evolution, and behavior); William P. Cunningham (genetics and cell biology); James W. Curtisinger (ecology, evolution, and behavior); Edward J. Cushing (ecology, evolution, and behavior); Gary E. Duke (veterinary biology); Paul V. Ellefson (forest resources); Luther P. Gerlach (anthropology); Hans M. Gregersen (forest resources); Robert T. Holt (political science); Anne R. Kapuscinski (fisheries and wildlife); D. Frank McKinney (Bell Museum of Natural History; ecology, evolution, and behavior); L. David Mech (fisheries and wildlife); Patrice A. Morrow (ecology, evolution, and behavior); Richard E. Phillips (ecology, evolution, and behavior); Philip J. Regal (ecology, evolution, and behavior); Peter B. Reich (forest resources); Anthony M. Starfield (ecology, evolution, and behavior); John R. Tester (ecology, evolution, and behavior)

*Adjunct Professor:* A. Richard Weisbrod (fisheries and wildlife)

*Associate Professor:* Donald N. Alstad (ecology, evolution, and behavior); Dorothy H. Anderson (forest resources); David A. Andow (entomology); Francesca J. Cuthbert (fisheries and wildlife); David L. Garshelis (fisheries and wildlife); Ralph W. Holzenthal (entomology); Peter A. Jordan (fisheries and wildlife); Linda L. Kinkel (plant pathology); James R. Kitts (fisheries and wildlife); Gerald J. Niemi (Natural Resources Research Institute); James A. Perry (forest resources); Patrick T. Redig (veterinary biology); Ruth G. Shaw (ecology, evolution, and behavior); J. L. David Smith (fisheries and wildlife); Roderick H. Squires (geography); Robert W. Sterner (ecology, evolution, and behavior); Robert M. Zink (Bell Museum of Natural History)

*Adjunct Associate Professor:* David E. Andersen (fisheries and wildlife); Kenneth L. Cole (forest resources); Frederick J. Jannett, Jr. (fisheries and wildlife); Ronald L. Tilson (fisheries and wildlife); Bruce C. Vondracek (fisheries and wildlife)

*Assistant Professor:* David N. Bengston (forest resources); Glenn R. Furnier (forest resources); Susan M. Galatowitsch (horticulture); Barbara J. Kanninen (public affairs); Shahid Naeem (ecology, evolution, and behavior)

*Research Associate:* Allen L. Lundgren (forest resources)

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

**Degrees Offered**—M.S. (Plan A and Plan B) and Ph.D.

**Curriculum**—The conservation biology program has two complementary aims leading to a unique interdisciplinary program. The program provides students with sound graduate training in the biological sciences relevant to the conservation of plants, animals, and ecosystems globally. Students study the social, political, and economic sciences that relate to both the recognition and solution of conservation problems. The overall objective of the program is to prepare students to develop solutions or approaches to these problems that are scientifically and environmentally sound and likely to be acted upon or implemented by existing social and political structures.

**Prerequisites for Admission**—A B.S. degree in biology or a closely related field is preferred. Applicants with a baccalaureate degree in another field are accepted, but may be required to make up selected courses in biology. In

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1 University of Minnesota, Duluth
general, Ph.D. applicants holding a baccalaureate degree are expected first to complete a master’s degree.

**Special Application Requirements**—A statement of career goals and three letters of recommendation evaluating the applicant’s potential for graduate study are required. The Graduate Record Examination General Test is required. The deadline for application is January 7; earlier application is encouraged for individuals seeking financial aid. Typically students are admitted only in fall quarter.

**Master’s Degree Requirements**—All master’s students must complete a minimum of 44 credits in the biological and social aspects of conservation biology. For Plan A students, 16 of these credits are thesis credits; Plan B students take 16 credits that include credits arranged for Plan B papers.

**Doctoral Degree Requirements**—Students complete a total of 68 graduate credit hours. Ph.D. candidates take the core courses and are expected to show competency in both the biological and social sciences. With their advisory committee, students develop a program that emphasizes the ecological and social aspects of conservation biology. Dissertation research may require proficiency in supporting areas (e.g., statistics, computing, communications).

**Language Requirements**—None.

**For Further Information, Applications, and a List of Courses**—Contact the Director of Graduate Studies, Conservation Biology Program, Department of Ecology, Evolution, and Behavior, University of Minnesota, 100 Ecology Building, 1987 Upper Buford Circle, St. Paul, MN 55108 (612/625-5732; e-mail siniff@ecology.umn.edu).

**Control Science and Dynamical Systems (CSDy)**

**Regents’ Professor:** Daniel D. Joseph (aerospace engineering and mechanics)

**Professor:** Tryphon T. Georgiou (electrical engineering), co-director; Donald G. Aronson (mathematics); Fredric N. Bailey (electrical engineering); Max Donath (mechanical engineering); David P. Fan (genetics and cell biology); William Garrard (aerospace engineering); Mostafa Kaveh (electrical engineering); John C. Kieffer (electrical engineering); Larry L. Kinney (electrical engineering); K. S. P. Kumar (electrical engineering); E. Bruce Lee (electrical engineering); Walter Littman (mathematics); Richard P. McGhee (mathematics); Katsuhiko Ogata (mechanical engineering); Linda R. Petzold (computer science); George R. Sell (mathematics); Yasutaka Sibuya (mathematics); Marian Stachowiak (electrical and computer engineering); Marvin L. Stein (computer science); Kim A. Stelson (mechanical engineering); Allen R. Tannenbaum (electrical engineering); Ahmed H. Tewfik (electrical engineering)

**Associate Professor:** Gary J. Balas (aerospace engineering and mechanics), co-director and director of graduate studies; Daniel Boley (computer science); Maria Gini (computer science); Nikolaos P. Papanikolopoulos (computer science); Yiyuan Zhao (aerospace engineering and mechanics)

**Adjunct Associate Professor:** Dale F. Enns (aerospace engineering and mechanics)

**Assistant Professor:** Prodromos Daoutidis (chemical engineering and materials science); Andrew R. Teel (electrical engineering)

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

**Degree Offered**—Ph.D.

**Curriculum**—Student programs must emphasize modeling—mathematical and physical analyses of control and/or dynamical systems, with some computational or numerical expertise—and two areas selected from the following three: control theory for deterministic processes; stability theory and general analysis of dynamical systems; stochastic processes and information theory.

**Prerequisites for Admission**—Applicants must have completed a master’s degree in one of the related fields of engineering, computer science, mathematics, statistics, or physics. Master’s degrees with an emphasis in control science and/or dynamical systems can be earned in any of these programs at Minnesota. An applicant with a master’s degree in another area whose scientific, mathematical, and/or engineering

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1 University of Minnesota, Duluth
background is adequate to pursue the program also is considered. A high level of proficiency in mathematics is necessary to successfully complete the Ph.D. program. Applicants are strongly encouraged to obtain a faculty adviser before formally applying to the program.

**Special Application Requirements**—Three letters of recommendation evaluating the applicant’s scholarship and a complete set of transcripts are required. At least one letter of recommendation must be from a faculty member familiar with the applicant’s previous graduate work. Because faculty are drawn from a number of disciplines and students’ programs can reflect a variety of emphases, it is important for applicants to clearly specify career goals and program emphasis desired in their application materials. Submission of Graduate Record Examination scores is strongly encouraged.

**Doctoral Degree Requirements**—Programs are designed by the student and the adviser. Coursework is normally selected from those courses in science, mathematics, engineering, and related fields that are relevant to the field of control science and dynamical systems. The written preliminary examination covers three of the four areas of emphasis (see Curriculum above). Normally students can prepare for this examination by completing three 8xxx or suitably advanced courses in three of the four areas. In addition, students normally take substantial coursework in advanced mathematics.

**Language Requirements**—For emphases other than mathematics, one foreign language. For the emphasis in mathematics, a second foreign language or a special project.

**For Further Information and Applications**—Contact the Control Science and Dynamical Systems Center, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612/625-3364; e-mail csdy@aem.umn.edu).

**Creative Writing**

See English.

**Curriculum and Instruction**

*Professor:* Barbara M. Taylor, chair; Richard W. Beach; Thomas R. Berger; Carol A. Carrier; John J. Cogan; William E. Gardner; Michael F. Graves; Harlan S. Hansen; Ilene B. Harris; Roger T. Johnson; Richard Kimpston (emeritus); Judith Lambrecht; Dale L. Lange; Frances P. Lawrenz; Darrell R. Lewis; John C. Manning; Dianne L. Monson; Thomas R. Post; S. Jay Samuels; James E. Stochl; Ruth G. Thomas

*Associate Professor:* Margaret K. DiBlasio, director of graduate studies; Eugene M. Anderson; Patricia G. Avery; J. Michael Bennett; Fred N. Finley; Kerry J. Freedman; Patricia A. Heller; Simon R. Hooper; Helen L. Jorstad; Jean A. King; Laura C. Koch; Robert E. Orton; R. Michael Paige; Rosemarie J. Park; Diane J. Tedick; Constance L. Walker

*Assistant Professor:* Felipe Golez; Margaret Y. Phinney; Susan M. Watts

*Lecturer:* Sandra J. Balli; L. Joanne Buggey; Melodee Landis

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

**Degrees Offered**—M.A. (Plan B only) in education (emphasis in curriculum and instruction), art education, elementary education, and mathematics education; Ph.D. in education (emphasis in curriculum and instruction); and Certificate of Specialist in Education.

**Curriculum**—Majors for the master’s degree in art education, education, elementary education, and mathematics education are administered by the Department of Curriculum and Instruction, under the direction of a single director of graduate studies. The education major with emphasis in curriculum and instruction is divided into the following concentration areas: curriculum studies; English education; instructional systems; reading education; science education; second languages and cultures education; and social studies education.

For the Ph.D. degree in education with emphasis in curriculum and instruction, concentrations include art education, communications education (children’s literature, English education, language arts, and reading), curriculum and instruction (curriculum studies, early childhood education, instructional...
systems), elementary education, mathematics education, science education, second languages education, and social science education.

The specialist certificate is offered in curriculum supervision and mathematics education.

**Prerequisites for Admission**—Prerequisites vary among areas of emphasis or concentration. Generally a bachelor’s degree with licensure fulfills the requirement. For some areas, however, there is no equivalent undergraduate program. In that case, 15 to 20 credits of work at the undergraduate level determined acceptable by advisers and the director of graduate studies are adequate. Some areas require a minimum of one year of teaching experience.

**Special Application Requirements**—Scores from the Graduate Record Examination are required. Master’s and doctoral applications are reviewed by the department on specific dates in the fall, winter, and spring quarters.

**Master’s Degree Requirements**—Students must complete requirements in the areas common to all emphasis areas, in behavioral and humanistic studies, in multicultural education, and in preparation for research. A final oral examination is required.

**Doctoral Degree Requirements**—Requirements include core courses and coursework in the concentration. Students must show competency in methodology; social, historical, and philosophical foundations; and psychological foundations.

**Specialist Certificate Requirements**—Students complete coursework in an area of emphasis and related studies. An internship, a project, and final examination are required.

**Language Requirements**—For the master’s degree and specialist certificate, none. For the doctoral degree, some concentrations require at least one foreign language.

**Minor Requirements for Students Majoring in Other Fields**—Requirements are designed according to individual student needs.

**For Further Information and Applications**—Contact the Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2545).
CI 5085. Practicum in Art Education. (2-9 cr, §ArEd 5605; prereq #)
Independent project under direction; gathering data, developing proposals, experimenting with evaluating innovative practices.

CI 5086. Student Teaching in Art Education. (3 or 6 or 12 cr, §ArEd 3600; prereq 5150, 5110 or Elem 3101 or SeEd 3150)
Observation of, participation in, and supervisory experiences with various types and levels of art classes.

CI 5101. Workshop: Programs and Procedures of Curriculum Development in Elementary Schools. (1-3 cr, §Elem 5101; prereq elem school tchg exper, #; S-N only)
Leadership in procedures; operational processes; major considerations in planning and organizing; interpersonal relationships, and evaluation of improvement programs.

CI 5110. Introduction to Elementary School Teaching. (3 cr, §Elem 3101, §Elem 5000; prereq ¶5183, elem educ major or CLA music educ major or §) Curriculum, organization, instruction, management, and professional decision making.

CI 5113. Classroom Management in the Elementary School. (4 cr, §Elem 5145, §SeEd 5145; prereq tchg or admin exper or #)
For teachers, administrators, and support staff. Management of student behavior, instruction as it relates to student behavior, and teacher organizational tasks in the classroom.

CI 5130. Introduction to Curriculum Studies. (4 cr, §CISy 5600)
Definitions of curriculum; historical and current issues; curriculum principles and theories; alternative models and methods of design and evaluation.

CI 5133. Curriculum Planning and Design. (4 cr, §CISy 5605)
Theoretical and practical bases of interdisciplinary curriculum design; models for developing interdisciplinary approaches to curriculum design and implementation; evaluating interdisciplinary curricula.

CI 5136. History of Curriculum in the United States. (4 cr, §CISy 5607)
Survey of formation of public school subjects and curriculum history in the United States from their European roots and early development in 19th century to contemporary issues of reform discussed in relation to the past. Social, political, and economic implications of curriculum history.

CI 5137. The Multicultural Gender-Fair Curriculum. (4 cr, §Elem 5225, §SeEd 5225)
Planning for development and implementation of multicultural and gender-fair perspective in elementary and secondary classrooms. Individual teacher goals, professional issues, and resources and teaching strategies for successfully exploring new perspectives.

CI 5138. Multicultural and Moral Perspectives on Classroom Instruction. (4 cr; prereq MED or grad student or #)
Factors leading to effective communication in ethnically diverse classrooms, preschool through adult. Communication techniques and classroom structures that have cultural and moral implications.

CI 5145. Curriculum Topics. (1-4 cr [max 6 cr], §CISy 5100; offered when feasible)

CI 5149. America’s Schools in the 20th Century. (3 cr, §CISy 5370, §EdPA 5370; prereq educ or grad student or #)
Analysis and interpretation of events and issues that shaped America’s schools in 20th century; current education reform proposals and their antecedents.

CI 5150. Secondary School Teaching. (3 cr, §SeEd 5250; prereq educ or CLA music educ student or #; ¶5185 or regis in approved program area practicum)
Curricular, instructional, managerial, leadership, and professional functions.

CI 5152. Innovation and the Instructional Process. (3 cr, §CISy 5100; prereq MED or grad student or #)
Information, concepts, and interpretive frameworks for comprehending, analyzing, and evaluating innovations and the process that brings them about. Developing and consuming instructional innovations.

CI 5153. Thematic Instruction for Middle Grades. (2 cr, §AdEd 5191, §Educ 5191, §Elem 5191, §SeEd 5291)
Logical and contextual relationships among mathematics, science, and social studies as taught in middle grades.

CI 5155. Classroom Instruction and Assessment. (4 cr, §CISy 5902; prereq MED or grad student)
Identifying goals, selecting instructional strategies, and developing assessment procedures for contemporary K-12 students. Incorporates issues related to multicultural education and reflective teaching.

CI 5156. Techniques of Instruction. (3 cr, §SeEd 5132)
Cross-departmental course for developing individual competencies, applying current psychological research to classroom instruction, and defining objectives in terms of achievable student competencies.

CI 5160. Supervision of Elementary, Secondary, and Postsecondary Instruction. (3 cr, §CISy 5800; prereq 5130 or CISy 5600)
Achievement of appropriate teaching expectations focusing on problems of personnel responsible for their improvement.

CI 5162. Peer Coaching for Teachers. (1-3 cr, §CISy 5801; prereq grad or MED student)
Teachers coaching teachers: acquiring concepts, skills, and dispositions for observing classroom instruction and providing feedback.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI 5170</td>
<td>Classroom Management in the Secondary Schools.</td>
<td>3 cr</td>
<td>§Elem 5145, §SeEd 5145</td>
<td>For teachers, administrators, and support staff working in secondary school programs: focus on management of student behavior, instruction as it relates to student behavior, and teacher organizational tasks in the classroom.</td>
</tr>
<tr>
<td>CI 5172</td>
<td>Teaching Students With Learning Difficulties.</td>
<td>3 cr</td>
<td>§Elem 5107</td>
<td>Diagnosis of pupil difficulty; development and prevention; tests as aids to teaching; following up a testing program; socioemotional problems associated with learning difficulties.</td>
</tr>
<tr>
<td>CI 5178</td>
<td>Project in Teacher Leadership.</td>
<td>1-9 cr</td>
<td>§5188, §EdPA 5178; prereq grad student or #</td>
<td>Create and present project for instigating and/or promoting change within education.</td>
</tr>
<tr>
<td>CI 5180</td>
<td>Clinical Experience in Elementary School Teaching.</td>
<td>6-12 cr</td>
<td>§Elem 5212</td>
<td>Supervised classroom teaching.</td>
</tr>
<tr>
<td>CI 5183</td>
<td>Applying Instructional Methods in the Elementary School.</td>
<td>2 cr per qtr [max 4 cr]</td>
<td>§Elem 5211</td>
<td>Supervised experience in elementary school classrooms.</td>
</tr>
<tr>
<td>CI 5184</td>
<td>Pre-Fall Student Teaching in Elementary Schools.</td>
<td>3 cr</td>
<td>§Elem 3610; prereq 9 cr methods, Δ</td>
<td>Observing and teaching beginning fall semester in public schools until University classes begin.</td>
</tr>
<tr>
<td>CI 5185</td>
<td>Orientation in the Secondary Schools.</td>
<td>0-2 cr</td>
<td>§SeEd 5251; prereq §5150</td>
<td>Supervised observation in classroom and related school activities.</td>
</tr>
<tr>
<td>CI 5186</td>
<td>School-Related Projects in Curriculum and Instruction.</td>
<td>1-12 cr</td>
<td>§5090, §5480, §5583, §5669, §5764; prereq MEd student in CI or #</td>
<td>Individual or group work on curricular, instructional, or evaluation problems and projects applicable to school situations.</td>
</tr>
<tr>
<td>CI 5187</td>
<td>Practicum: Improvement of Teaching in Elementary or Pre-Kindergarten Schools.</td>
<td>3 cr</td>
<td>§Elem 5602; prereq MEd student in elem educ or in early childhood educ</td>
<td>Elementary school classroom teaching project for improving specific teaching skills; planned by student and approved and directed by student’s adviser as part of M.Ed. program.</td>
</tr>
<tr>
<td>CI 5190</td>
<td>Directed Individual Study in Curriculum and Instruction.</td>
<td>1-6 cr</td>
<td>§CISy 5509; prereq #</td>
<td>Producing and evaluating curricular materials; review and analysis of literature concerning issues or problems; assessing curriculum processes.</td>
</tr>
<tr>
<td>CI 5195</td>
<td>Directed Study in Elementary and Secondary Education.</td>
<td>Cr ar</td>
<td>§Elem 5351; prereq educ or grad student; S-N optional</td>
<td>Individual or group work on curricular, instructional, or evaluation problems.</td>
</tr>
<tr>
<td>CI 5250</td>
<td>Current Trends in Early Childhood Education.</td>
<td>4 cr</td>
<td>§Elem 5377; prereq tcg exper in kindergarten or primary or #</td>
<td>Continuing needs of children in our changing culture; current practices and recent research; curriculum assessment techniques and evaluation of education materials.</td>
</tr>
<tr>
<td>CI 5252</td>
<td>Contemporary Programs for Young Children.</td>
<td>3 cr</td>
<td>§Elem 5378; prereq MEd student in early childhood educ</td>
<td>Growth and development of preschool children in light of need for curriculum intervention programs; current trends, program evaluation, and recent research.</td>
</tr>
<tr>
<td>CI 5280</td>
<td>Student Teaching in the Kindergarten.</td>
<td>3-6 cr</td>
<td>§3280; prereq 5250, 6 cr elem student teaching or current elem license</td>
<td>Five half-days each week in supervised teaching and observation in public or private kindergartens.</td>
</tr>
<tr>
<td>CI 5281</td>
<td>Student Teaching in the Nursery School.</td>
<td>3-6 cr</td>
<td>§Elem 3604; prereq approval of major adviser and director of student tcgh</td>
<td>Supervised teaching.</td>
</tr>
<tr>
<td>CI 5300</td>
<td>Technology for Teaching and Learning.</td>
<td>2 cr</td>
<td></td>
<td>Using technology for accessing and creating educational materials. Using diverse educational technologies for communicating with other users, accessing and sorting electronic databases, creating multimedia documents, and publishing on the Internet.</td>
</tr>
<tr>
<td>CI 5310</td>
<td>Microcomputer Uses in the Elementary Classroom.</td>
<td>3 cr</td>
<td>§CISy 5206, §Elem 5140</td>
<td>Using microcomputers to enhance instruction across curriculum.</td>
</tr>
<tr>
<td>CI 5331</td>
<td>Instructional Systems: Trends and Issues.</td>
<td>1-3 cr</td>
<td>[max 9 cr]; offered when feasible</td>
<td></td>
</tr>
<tr>
<td>CI 5335</td>
<td>Introduction to Instructional Systems and Technology.</td>
<td>4 cr</td>
<td>§CISy 5151</td>
<td>Historical foundations, contemporary issues, and research base of instructional systems.</td>
</tr>
<tr>
<td>CI 5337</td>
<td>Principles and Procedures in Designing Instruction.</td>
<td>4 cr</td>
<td>§CISy 5209</td>
<td>Major models of instructional development; generic components; design models; review of instructional design and learning environments.</td>
</tr>
<tr>
<td>CI 5351</td>
<td>Topics: Computer-Based Tools for Teachers.</td>
<td>4 cr</td>
<td>§CISy 5208</td>
<td>Use of technology for material generation, record keeping, and classroom management tasks in K-12 classrooms.</td>
</tr>
</tbody>
</table>
CI 5355. Introductory Educational Technology Methods. (4 cr, §CISy 5080)
Techniques for evaluating and selecting hardware and software to meet instructional needs. Strategies and techniques for integrating educational technology to meet curricular goals and objectives.

CI 5356. Advanced Education Technology Methods. (1-6 cr [no more than 3 cr may be applied to IS concentration within the educ MA and PhD programs], §CISy 5090; prereq 5355 or 5360 or CISy 5003 or CISy 5080 or #)
Selecting hardware and software, integrating technology into a variety of curricular areas. Developing and implementing plans for integrating technology into classroom instruction.

CI 5360. Teaching via the Internet. (4 cr)
Using the Internet to access and publish educational materials. Creating multimedia documents and publishing on the World Wide Web.

CI 5362. Introduction to Computer-Based Instructional Design. (4 cr; A-F only)
Mathematics or science background not required.

CI 5363. Computer-Based Instruction: Introduction to Design. (3 cr, §CISy 5205; prereq 5362 or CISy 5006 or #)
Computer uses in education and training; models for designing computer-based instruction with emphasis on interface design.

CI 5364. Computer-Based Instruction: Design and Development. (4 cr, §CISy 5212; prereq 5362 or CISy 5205 or #; offered when feasible)

CI 5367. Interactive Multimedia Instruction. (4 cr, §CISy 5207; prereq 5337 or 5363 or #)
Multimedia technologies; design and development of interactive instruction.

CI 5390. Directed Individual Study in Curriculum and Instruction. (1-6 cr [max 6 cr], §CISy 5509; prereq #)
Production and evaluation of curricular materials; review and analysis of literature concerning issues or problems; assessment of curriculum processes.

CI 5400. Survey of Children's Literature. (3 cr, §Elem 5210; prereq educ student or #)
Techniques of and materials for teaching with children’s literature in elementary schools.

CI 5401. Literature for the Elementary School. (4 cr, §Elem 5300)
Evaluative survey of books for children; research related to children’s reading interests; selection of literature.

CI 5402. Survey of Special Collections in Children’s Literature. (3 cr, §Elem 5305; prereq 5401 or #)
Content and accessibility of collections that relate the creation of books; emphasis on possibilities and methods for interpreting content of collections to children.

CI 5403. Creative Writing for and by Children. (1-3 cr [max 6 cr], §Elem 5318; prereq 3400 or 3420 or Elem 3300 or Elem 3316 or elem tchg exper or #)
Literature and writing in elementary school for experienced teachers, graduate students, and college instructors; emphasis on aspects of writing and illustrating children’s literature and on children’s own writing.

CI 5410. Teaching Reading in the Elementary School. (3 cr, §Elem 5331; prereq 9 cr educ)
Elementary school reading programs from perspectives of historical change, language research, and sociocultural demographics.

CI 5411. Reading Difficulties: Assessment and Instruction. (4 cr, §Elem 5334; prereq 5410 or 5450)
Causes, prevention, and correction; remedial practices useful to the classroom teacher, school counselor, and reading specialist.

CI 5413. Teaching Students With Reading Difficulties. (4 cr, §Elem 5336; prereq 5172 or 5411 or Elem 5334 or Elem 5107, #)
Assessment and tutoring of individual children who have difficulty in school learning.

CI 5414. Literacy Development in the Primary Grades. (4 cr, §Elem 5337; prereq 3410 or elem teacher or #)
Theory and practice of integrating teaching of reading, literature, writing, and language.

CI 5415. Literacy Development in the Intermediate Grades. (4 cr, §Elem 5338; prereq 3410 or elem teacher or #)
Theory and practice of integrating teaching of reading, literature, writing, and language.

CI 5416. Workshop: Curriculum Implementation in Elementary School Reading. (1-9 cr [max 9 cr], §Elem 5339; prereq elem tchg exper or #; offered when feasible)

CI 5418. Whole Language in the Elementary School. (4 cr, prereq educ or grad student)
Philosophy and practice of whole language teaching. Meaning-based integration of reading/writing; learner support; noncompetitive environments; locus of control; performance-based assessment, including miscue analysis; theoretical, social, and political implications.

CI 5420. Teaching Writing in the Elementary School. (4 cr, §Elem 5315; prereq postbac or MEd or grad student)
Theory and research on writing process, applications to developing an elementary school writing curriculum.

CI 5425. Teaching Language Arts in the Elementary School. (3 cr, §Elem 5316; prereq 3420 or elem tchg exper)
Improvement of instruction, study of trends in English education.

CI 5440. Teaching Literature in Secondary Schools. (4 cr, §SeEd 5321)
Current theory and methods of instruction; research and response to literature and reading; adolescent literature; growth assessment; curriculum design and evaluation.
CI 5441. Literature for Adolescents. (3 cr, §SeEd 5320) Reading and analysis of fiction and nonfiction; methods for critically assessing quality and appeal. Appropriate for secondary English and social studies teachers and librarians.

CI 5450. Teaching Reading in Content Areas. (4 cr, §SeEd 5344) Methods of accommodating to student abilities and facilitating reading in regular content classes.

CI 5451. Secondary Remedial Reading Instruction. (4 cr, §SeEd 5175; prereq 5410 or 5450) Principles and techniques for developing and conducting programs for secondary students seriously deficient in reading skills; methods for assessing these students' proficiency and progress.

CI 5460. Teaching Writing in Secondary School and College. (4 cr, §SeEd 5322) Historical and contemporary context; analysis of composing processes; prewriting and revision; audience analysis; comprehension and coherence; selected problems in assigning and evaluating writing.

CI 5461. Diagnosing and Assessing Writing in Secondary Schools. (3 cr, §SeEd 5323; prereq educ jr or sr or grad student) Application of theory and research on composition instruction to analysis of diagnosis of writing samples; evaluation of writing using written or conference feedback; large group writing assessment using different rating scales; development of assignments and curriculum materials for writing instruction.

CI 5470. Classroom Research in Literary Education. (3 cr, §SeEd 5176) Review and analysis of current studies; design and analyses for school-based research.

CI 5472. Teaching Film, Television, and Media Studies. (3 cr, §SeEd 5326) Current theory and methods of teaching critical response to film, television, and media; techniques of film/video production, genres, history; methods for analyzing cultural roles in media; integration and use of short films and videos with English and social studies instruction.

CI 5473. Language, Culture, and Education. (4 cr, §SeEd 5404, §Spch 5404) Psychological and social-psychological perspectives for study of language-communication; dimensions of language variation (dialects, codes, registers); implications for program development and instructional practices.

CI 5485. Directed Experiences in Teaching English. (6-12 cr, §SeEd 3621; prereq 5475 or SeEd 5350)

CI 5491. Current Developments in English Education. (1-6 cr [max 12 cr], §SeEd 5350; offered when feasible)

CI 5500. Teaching Science in the Elementary School. (3 cr, §Elem 5346; prereq postbac in elem educ or #; offered when feasible)


CI 5504. Materials and Resources for Elementary School Science. (4 cr; prereq elem tchg exper) Using educational materials and media common to the teaching of modern elementary school science.

CI 5506. Teaching Health in the Elementary Schools. (1 cr, §Elem 5213; prereq elem postbac student or #) Techniques of and materials for teaching health at elementary level.

CI 5530. Science Education for the Middle School. (4 cr, §SeEd 5700; prereq science educ postbac student or #) Planning science education.

CI 5531. Teaching Secondary School Science: A Constructivist Approach. (4 cr, §SeEd 5702; prereq 5530, 5580 or SeEd 5700, SeEd 5701, ¶CI 5581 or ¶SeEd 5703, postbac science educ student or #) Science teaching methods.

CI 5532. Current Developments in Secondary School Science Teaching. (4 cr, §SeEd 5390; prereq MEd or grad student or #) Curricula, methods, materials of instruction, evaluation.

CI 5533. Studies in Science Education. (4 cr, §SeEd 5397; prereq MEd or grad student or #) Improvement of science teaching through application of research findings.

CI 5534. Foundations of Science Education. (4 cr, §SeEd 5706; prereq MEd or grad student) Analyzes present practice in light of historical and philosophical foundations of science education.

CI 5535. Advanced Methods of Secondary Science Teaching and Assessment. (4 cr; prereq MEd or grad student or #)

CI 5537. Workshop: Science Education. (1-8 cr [max 16 cr], §SeEd 5394) For middle and high school and college science teachers. Issues, materials, and instructional techniques. Topic varies.

CI 5572. Seminar: Reflecting On Clinical Experience in Science Teaching. (3 cr, §SeEd 5705; prereq 5331 or SeEd 5702, SeEd 5703 or #; ¶CI 5582) Reflections and issues.

CI 5580. Applying Science Methods in Middle and Secondary Schools. (1-4 cr [max 10 cr], §SeEd 5701, §SeEd 5703; prereq ¶5530 or ¶5531, postbac science educ student or #) Practicum in conducting, analyzing, and reflecting on science teaching.

CI 5582. Clinical Experience in Science Teaching. (6 or 12 cr, §SeEd 5704; prereq 5531, 5581, ¶5572 or SeEd 5702, SeEd 5703, ¶SeEd 5705, #) Supervised clinical experiences in secondary school science teaching.
CI 5619. Teaching Second Languages and Cultures in Elementary Schools. (4 cr, §Elem 5319)
Methods and materials; developing oral and written communication; consideration of alternatives in program format; preparation of materials; global awareness and cross-cultural experience; assessing children’s language; children’s literature, games, songs, developing units and lessons.

CI 5620. Second Languages and Young Children: Like Child’s Play. (4 cr, §Elem 5321)
Current approaches to teaching second languages to young children; how young children acquire language; effects of bilingualism on child development; rationales, advantages, and pedagogical theories of program models, from full immersion to programs that emphasize cultural understanding.

CI 5631. Second Language Curriculum. (3 cr per qtr [total 9 cr], §SeEd 5801; prereq postbac student)
Course spans one academic year; component of teacher education program. Nature of school and second language curriculum; variety of curricular orientations and their implications for instruction and evaluation.

CI 5632. Second Language Instruction. (3 cr per qtr [total 9 cr], §SeEd 5802; prereq postbac student)
Course spans one academic year; component of teacher education program. Developing skills for selecting, organizing, and providing effective second language learning opportunities through observation, practice, and reflection.

CI 5633. Second Language Research. (2 cr per qtr [max 6 cr], §SeEd 5803; prereq graduate of SLC postbac licensure, 6 cr after licensure)
Classroom-based examination of teaching and student learning over academic year.

CI 5642. Assessment of Learners With Limited English Proficiency. (4 cr, §SeEd 5218)
Social, political, and educational context of assessing students with limited English proficiency; evaluation vs. research and implications for bilingual schooling, curriculum development, and materials selection; methods for assessing language proficiency and academic achievement.

CI 5645. Schooling Outcomes for a Multietnic Society. (4 cr, §SeEd 5221)
Analysis of schooling experiences for students of African-American, Hispanic, Asian, and American Indian backgrounds. Changing perspectives concerning ethnic student achievement, research on factors influencing school achievement, and prospects for change.

CI 5650. Second Language and Cultures Education: Introduction and Overview. (4 cr, §SeEd 5186)
Curricula and instruction in various settings: elementary, secondary, open, free, suburban, and center city schools; bilingual programs; colleges, community colleges, universities, and adult programs including teacher preparation.

CI 5652. Teaching Culture: Theory and Application. (4 cr, §SeEd 5122; prereq postbac or grad student)
Analysis of concept; related factors and materials for classroom use; culture shock; empathy; culture conflict, awareness, learning.

CI 5656. Reading and Writing in a Second Language. (4 cr, §SeEd 5219)
Reading comprehension and composing processes in a second language; relationship between first and second language comprehension and composing processes, between reading and writing, and between culture and reading comprehension and writing; politics of literacy; assessment of second language literacy.

CI 5657. Speaking and Listening in a Second Language. (4 cr, §SeEd 5385)
Theories and methods of teaching language as communication in oral and aural modes; planning student interaction; classroom organization for learning and acquisition. Students complete reflective analyses of lessons.

CI 5658. Second Language Testing, Assessment, and Evaluation. (4 cr, §SeEd 5382)
Language proficiency assessment. English as a second language, bilingual education; oral interviews; testing communicative abilities; standardized language measures; building test items; evaluating programs; aptitude and attitude measurement.

CI 5660. Special Topics in the Teaching of Second Languages and Cultures. (1-10 cr [max 10 cr], §SeEd 5191)
Related specifically to the needs of the in-service teacher; topics, location, and duration is highly flexible.

Development of competencies in curriculum and materials construction; application to lessons, units, modules, courses, levels of instruction in ongoing programs of second language acquisition in schools.

CI 5680. Practicum: Teaching Second Languages and Cultures in Elementary Schools. (3 cr, §Elem 5320; prereq 5619 or Elem 5319, ¶CI 5619 or ¶Elem 5319, #; S-N only)
Minimum of three hours weekly of supervised teaching and observation in elementary schools.

CI 5684. Clinical Experiences in Second Languages. (6 cr per qtr [max 12 or 18 cr]; prereq initial licensure/MEd student)
Component of second languages teacher education program. Teaching and learning experiences in elementary and secondary second language.

CI 5690. Directed Study in Second Languages and Cultures. (Cr ar [max 6 cr], §SeEd 5351; prereq educ or grad student; S-N optional)
Individual or group work on curricular, instructional, or evaluation problems.
CI 5700. Teaching Social Studies in the Elementary School. (3 cr, §Elem 5361; prereq 5110 or Elem 3101 or equiv, postbac student) Content and organization of social studies programs; programs of understanding, improving the learning situation, and effective use of materials.

CI 5730. Social Studies for the In-Service Elementary/Middle School Teacher. (4 cr, §Elem 5361; elem tchg exper or #) Content and organization of social studies programs; programs of understanding, improving the learning situation, and effective use of materials.

CI 5740. Introduction to Social Studies Education. (4 cr, §SeEd 5152; prereq postbac student) Analysis of teaching strategies and contemporary curriculum materials in the social studies; techniques of instruction useful in inquiry; strategies of analysis; classroom behavior and evaluation; required of all M.A., M.Ed., and Ph.D. candidates.

CI 5741. Advanced Methods for Teaching the Social Studies. (4 cr, §SeEd 5150; prereq postbac student) Advanced methods for social studies teachers; prerequisite to other graduate-level courses in social studies education.

CI 5742. The Social Sciences and the Social Studies. (3 cr per qtr [max 6 cr], §SeEd 5153; prereq postbac student) Issues, materials, and instructional techniques.

CI 5743. Seminar: Reflecting on the Clinical Experience in Social Studies Education. (3 cr; prereq social studies tchg major or #) Reflecting on student teaching experience, developing a professional identity, and refining teaching skills.

CI 5744. Teaching About the Newspaper in the Classroom. (1-3 cr [max 4 cr], §Elem 5227, §SeEd 5227) Institution of the newspaper; articulation of series of useful instructional strategies, curriculum development techniques, and teaching materials.

CI 5746. Global and Environmental Education: Content and Practice. (4 cr; offered alt yrs) To help classroom teachers, curriculum specialists, and administrators assess current issues, instructional methods, and materials.

CI 5760. Social Studies for the Inservice Middle/Secondary School Teacher. (4 cr, §SeEd 5152; prereq secondary tchg licensure or #) Provides broader understanding of each of the social sciences; central concepts and generalizations, methods of inquiry, pedagogical techniques, and resources.

CI 5780. Practicum: Secondary Social Studies Education. (1-7 cr [max 7 cr], §SeEd 3152; prereq educ student, Δ for postbac students) Pre-student-teaching experience for developing teacher competencies; supervised observation and participation in classroom and related school activities.

CI 5782. Student Teaching in Secondary Social Studies. (3-15 cr [max 15 cr], §SeEd 3641; prereq postbac MEd student)

CI 5821. Teaching Mathematics in the Elementary School. (3 cr, §Elem 3391; prereq 5110 or Elem 3100, Elem 3101, Math 1005, Math 1006) Principles of learning pertinent to modern program of mathematics in primary and elementary grades; objectives, content, philosophy, instructional materials, and methods of instruction and evaluation.

CI 8075. Seminar: Art Education. (1 cr, §ArEd 8306) Reports, evaluation of problems, recent literature.

CI 8079. Research in Art Education. (3 cr, §ArEd 8300) Research techniques.

CI 8099. Problems: Art Education. (Cr ar, §ArEd 8900; prereq #) Independent projects under staff guidance may include advanced studio practice or technical problems requiring experimental or library research.

CI 8130. Curriculum and Instruction Core: Critical Examination of Curricular Contexts. (3 cr, §CISy 8100; prereq PhD student or #) Impact of aesthetic, historical, social, political, and cultural forces on current curriculum contexts. Seminar.

CI 8131. Curriculum and Instruction Core: Teaching Theory and Research. (3 cr, §CISy 8102; prereq PhD student or #) Overview of research on teaching: historical perspective, modern empirical procedures and findings, and implications of research for practice and for future investigation.

CI 8132. Curriculum and Instruction Core: Research Methods in Curriculum and Instruction. (3 cr, §CISy 8103; prereq PhD student or #; A-F only) Purposes, approaches, and assumptions related to methods of educational research, such as descriptive, correlational, case-study, experimental, ethnographic, and developmental. Seminar.

CI 8133. Seminar in Teaching in Colleges of Education. (3 cr, §CISy 8201; prereq doctoral student or #; ¶8134) Goals, instructional strategies, and evaluation procedures.

CI 8134. Practicum in Teaching in Colleges of Education. (1 cr, §CISy 8202; prereq 8133 or CISy 8201, doctoral student or #) Supervised teaching in education course at University of Minnesota or at another college or university.

CI 8135. Interdisciplinary Curriculum Issues. (1-4 cr, §CISy 8416) Disciplinary and interdisciplinary learning in various settings, educational implications for conceptual relationships between professional disciplines, and relationships between curriculum and knowledge.
CI 8136. Curriculum Reform and Social Change. (4 cr, §CISy 8600; prereq 5100 or 5130 or CISy 5600 or Elem 5100 or #)
Connections between social change and educational reform movements; relationship of curriculum to school, society, and culture; methods and purposes of reform; and issues of implementation in various institutional and cultural settings with diverse populations.

CI 8140. Curriculum Implementation and Leadership. (4 cr, §CISy 8610)
Enactment of curriculum in various institutional and cultural settings; methods and processes of implementation; several types of curriculum packages and various populations; leadership strategies for curriculum specialists.

CI 8147. The Domain of Curriculum Theory and Research: Alternative Paradigms and Research Methods. (4 cr, §CISy 8620)
Assessment of inquiry traditions, research methods, and exemplar studies in empirical-analytic, deliberative, and reconceptualist traditions of curriculum. Includes survey of quantitative and qualitative research methods and other inquiry as applied to curriculum questions.

CI 8160-8161. Planning a Research Experience. (3, 3 cr; prereq 8132, concurrent regis in 1 cr independent study course with faculty in area of specialization)
Research questions, literature reviews, methodology, data collection devices, data collection, and how these interact to produce successful research.

CI 8190. Problems: Improvement of Instruction. (Cr ar, §Elem 8991; prereq #)
For students qualified to make intensive studies of problems related to school supervision.

CI 8198. Problems: Teacher Education. (3-9 cr; prereq #)
Research in supervision, organization, and administration; lab experiences at elementary and secondary levels.

CI 8199.* Problems: Curriculum Studies. (3-9 cr, §CISy 8501; prereq PhD student)
Individual empirical investigation.

CI 8290. Problems: Teaching Kindergarten. (3 cr, §Elem 8976; prereq #)
Opportunity for in-depth study or research related to self-selected interest areas in kindergarten education.

CI 8361. Advanced Courseware and Design: Issues. (4 cr, §CISy 8411; prereq 5364 or CISy 5212 or #; offered when feasible)

CI 8390.* Problems: Instructional Systems. (Cr ar, §CISy 8501; prereq #)
Individual empirical investigation.

CI 8391. Instructional Systems Seminar. (2 cr [max 6 cr], §CISy 8416; prereq #; offered alt yrs)
Problems and issues in instructional theory and research.

CI 8400. Special Topics in Children’s and Young Adult Literature. (1-9 cr [max 9 cr], §Elem 8300)
Study of original manuscripts and artwork for children’s books; research in children’s response to literature.

CI 8412. Research in Reading. (4 cr, §Elem 8332; prereq #)
Critical analysis of methodology and findings of research; appraising research methods, population limitations, and educational implications.

CI 8413. Special Topics in Reading Research and Instruction. (1-9 cr [max 9 cr], §SeEd 8333; prereq #)
Problems of research at all levels; topics vary according to offering; presentation of proposed designs and current studies.

CI 8420. Research in Composition. (4 cr, §Elem 8316; prereq 5425 or 5460 or Elem 5316, #)
Review of research on writing processes of kindergarten-college students and factors influencing those processes.

CI 8471. Special Topics in Literacy. (1-9 cr [max 9 cr], §SeEd 8899; prereq #)
Selected topics with implications for curriculum development and change.

CI 8492. Readings in English Education and Reading. (1-3 cr, §SeEd 8895)
Readings in secondary school English curriculum and instruction.

CI 8493. Problems: Teaching English and Reading. (Cr ar, §Elem 8916, §Elem 8931, §SeEd 8896)
For those qualified to undertake individual research.

CI 8500. Research Foundations of Science Education. (4 cr [max 16 cr], §Elem 8346, §SeEd 8887)
Critical review and analysis of classical research studies; criteria for appraising research findings; educational implications.

CI 8570. Advanced Topics in Science Education. (4 cr [max 16 cr], §SeEd 8899)
Critical review and analysis of research in selected topics with implications for change in curriculum and instructional practices. Topics vary.

CI 8590. Problems: Science Education. (Cr ar, §SeEd 8871; prereq #; offered when feasible)

CI 8630. Research in Second Languages and Cultures Education. (4 cr, §SeEd 8188)
Identification and retrieval of information; preparation of research proposals, papers, and theses; examination of empirical research models; discussion of needed research; designing an individual study.

CI 8631-8632-8633. Research Seminar: Second Languages and Cultures Education. (3 cr per qtr [max 9 cr], §SeEd 8887; prereq 8630 or SeEd 8188)
Three-quarter seminar. Students select a problem; design an appropriate study; collect and analyze data; summarize results; prepare and submit a manuscript designed for publication; cooperate in critical review of projects.

CI 8650. Seminar: Special Topics in Second Languages and Cultures Research. (1-4 cr)

CI 8694. Problems: Second Languages and Cultures Education. (Cr ar [max 8 cr], §SeEd 8894)
Individual research.
Mathematics Education (MthE)

MthE 5020. Teaching Mathematics: Algebraic Structures. (3 cr; §5082; prereq 5010, 5610, math ed student or #)
Pedagogy, content, and instructional strategies for teaching algebra. Content and issues relevant to algebra curriculum. Instructional materials and appropriate technology.

MthE 5040. Teaching Mathematics: Advanced Topics. (3 cr; prereq math ed or grad student or #)
Pedagogy, content, and instructional strategies for teaching trigonometry, analysis, calculus, probability, statistics, discrete mathematics. Content and issues relevant to advanced mathematics curriculum. Instructional materials and appropriate technology.

MthE 5081. Teaching Arithmetic in the Secondary School. (3 cr; prereq math educ major or minor, Math 5081 or §5081 or #)
Survey of concepts, principles, and processes of secondary school pre-algebra curriculum; learning difficulties, teaching strategies and alternatives; mathematical foundations of pre-algebra topics.

MthE 5082. Teaching Algebra in the Secondary School. (3 cr; §5020; prereq math educ major or minor, Math 5082 or §5082 or #)
Survey of concepts, principles, and processes of secondary school curriculum; learning difficulties, teaching strategies and alternatives; mathematical foundations of algebra topics.

MthE 5083. Teaching Geometry in the Secondary School. (3 cr; prereq math educ major or minor, Math 5083 or §5083 or #)
Survey of concepts, principles, and processes of secondary school geometry curriculum; learning difficulties, teaching strategies and alternatives; mathematical foundations of geometry topics.

MthE 5101. Workshop: Elementary School Mathematics. (1-12 cr [max 12 cr]; not open to majors in math educ)
Modern trends, methods, and materials used to convey mathematical ideas.

MthE 5102. Workshop: Mathematics Education. (1-12 cr [max 12 cr])
Issues, materials, and instructional techniques focusing on a single current topic of particular relevance to secondary school and college mathematics teachers.

MthE 5150. Topics in Recreational Mathematics. (3 cr; prereq educ or grad student or #)
Survey including magic squares; palindromes, repunits, repdigits from number theory; geometric dissections, topological recreations, cryptarithms; uses as problem-solving modes in mathematics classrooms.

MthE 5151. Calculator Use in the Elementary and Middle School. (1-3 cr [max 3 cr]; prereq educ or grad student or #)
Structure and function of hand-held calculators. Materials and instructional techniques for integrating calculators into daily lessons; evaluating commercial materials; research on use of calculators in instructional settings.

MthE 5152. Geometry in the Elementary Grades. (1-3 cr [max 3 cr]; prereq educ or grad student or #)
Geometric content and pedagogy for grades K-8. Levels of geometric thought, formation of spatial abilities; early childhood concepts from topology, transformational geometry, Euclidean geometry, and applications; dimensional models, construction, planar tessellations.

MthE 5153. Geometry in the Intermediate Grades. (1-3 cr [max 3 cr]; prereq educ or grad student or #)
Instructional approaches and physical materials relating to teaching of informal and intuitive geometric concepts in intermediate and middle school grades. Fundamental concepts of measurements and geometric relationships in 1, 2, and 3 dimensions, measurement systems, estimation, geometric figures and their properties, transformations and symmetry, congruence and similarity.

MthE 5155. Rational Number Concepts and Proportionality. (1-3 cr [max 3 cr]; prereq educ or grad student or #)
Relationship between role of rational number concepts and developing proportional reasoning skills. Psychological, instructional, and pedagogical issues.

MthE 5157. Probability and Statistics in the Elementary School. (1-3 cr [max 3 cr]; prereq educ or grad student or #)
Principles for systematic observation; techniques for collecting, organizing, representing, and interpreting data.

MthE 5160. Developing Leadership in School Mathematics. (1-3 cr [max 3 cr]; prereq educ or grad student or #)
Current developments in psychology and pedagogy of mathematics education as they relate to evolving nature of mathematics education objectives. Emerging role of technology in mathematics curriculum. Effective techniques for developing supervisory abilities.
MthE 5170. Teaching Problem Solving, Reasoning, and Proof. (4 cr; prereq math ed or grad student or #)
Fundamental concepts and principles. Emphasis on activities and applications for junior and senior high classes. Pedagogical experiences to prepare teachers.

MthE 5171. Teaching Probability and Statistics. (3 cr, §SeEd 5274; prereq postbac educ student or #; at least 1 math course in probability or statistics or combinatorics recommended)
Fundamental concepts and principles. Emphasis on activities and applications for junior and senior high classes. Pedagogical experiences to prepare teachers to integrate quantitative literacy in classrooms.

MthE 5172. Historical Topics in the Mathematics Classroom. (3 cr; prereq math ed or grad student or #)
History of school mathematics content and methodology. Cross-cultural contributions in development of mathematical ideas; development of lessons, activities, and materials for school use.

MthE 5312. Teaching and Supervision of Mathematics in the Secondary School. (4 cr; prereq mathematics tchg exper or #)
Methods, materials, and curriculum development; principles of learning; review of research; preparation and evaluation of tests, units, and materials of instruction.

MthE 5313. Teaching and Supervision of Mathematics in the Middle School. (4 cr; prereq elem or secondary licensure)
Mathematics objectives, concepts and principles, skills and processes; instructional alternatives, including calculators and microcomputers; applying mathematics to individual differences; evaluation techniques for improving instruction and learning.

MthE 5332. Current Trends and Issues in School Mathematics. (4 cr; prereq 5312 or #)
Recent developments in mathematics curriculum and instructional alternatives, issues in teaching and learning; providing for special student needs; program planning and evaluation.

MthE 5355. Mathematics for Diverse Learners. (4 cr; prereq CI 5821 or #)
Units of instruction emphasizing mathematical concepts essential for vocational competence; experimental materials and methods designed to improve performance of low achievers.

MthE 5366. Technology-Assisted Mathematics Instruction. (4 cr; prereq CI 5362 or CISy 5006 or equiv, math ed or grad student or #)
Technology, including computers, programmable and graphing calculators, and video as instructional tools in mathematics; design and evaluation of technology-based mathematics lessons; effect of technology on mathematics curriculum; managing technology in the classroom.

MthE 5610. Clinical Experiences in Teaching Arithmetic. (2 cr; prereq 5600, ¶5010, math educ student or #)
Observing and participating in arithmetic classes. Supervised microteaching and peer teaching. Developing observational, classroom management, and communication skills.

MthE 5620. Clinical Experiences in Teaching Algebra. (2 cr; prereq 5610, ¶5020, math educ student or #)
Observing and participating in algebra classes. Supervised microteaching and peer teaching. Developing observational, classroom management, and communication skills.

MthE 5630. Clinical Experiences in Teaching Geometry. (2 cr; 5620, ¶5030, math educ student or #)
Observing and participating in geometry classrooms. Supervised microteaching and peer teaching. Developing observational, classroom management, and communication skills.

MthE 5640. Half-Day Student Teaching in Mathematics. (6 cr; prereq ¶5540, math educ student, enrollment in math educ initial licensure/MEd program) Student teaching in secondary school mathematics classes.

MthE 5650. Full-Day Student Teaching in Mathematics. (12 cr; prereq 5540, 5640, math educ postbac student or #)
Student teaching in secondary mathematics classes.

MthE 5680. Practicum in Mathematics Education. (3-9 cr [max 9 cr]; prereq #)
Supervised experience in teaching or related work in school.

MthE 8500. Theory and Classical Research in Mathematics Education. (3 cr; prereq 5311 or 5312 or #)
Critical review of research and relevant theoretical formulations; criteria for appraising research methods, educational implications.

MthE 8570. Research in Mathematics Education. (3-9 cr [max 9 cr]; prereq #)
Participation in supervision, instruction, curriculum development, or research to gain in-service experience in a leadership role; includes a seminar; related project; required for the specialist certificate in mathematics education.

MthE 8590. Seminar: Mathematics Education. (Cr ar [max 8 cr]; prereq #)
Problems of mathematics instruction at levels of kindergarten through junior college; opportunity to develop proposals and design models for empirical research.

MthE 8680. Internship: Mathematics Education. (Cr ar)
Participation in supervision, instruction, curriculum development, or research to gain in-service experience in a leadership role; includes a seminar; related project; required for the specialist certificate in mathematics education.

MthE 8980. Problems: Mathematics Education. (Cr ar; prereq 8500 or 8570)
Surveying the most recent literature, designing and preparing research reports on special problems.
Dentistry

Regents’ Professor: Robert J. Gorlin (emeritus)
Professor: Robert A. Vickers, director of graduate studies; Dwight L. Anderson; M. Bashar Bakdash; Muriel J. Bebeau; David O. Born; Jaroslav Cervenka; Anthony J. DiAngelis; William H. Douglas; Mohamed E. N. ElDeeb; Richard P. Elzy; James R. Fricton; Mark C. Herzberg; Myer S. Leonard; William F. Liljemark; Leslie V. Martens; Karlind T. Moller; Bruce L. Pihlstrom; Charles F. Schachtele; Erwin M. Schaffer (emeritus); Eric L. Schiffman; Burton L. Shapiro; T. Michael Speidel; Michael J. Till; Larry F. Wolff
Clinical Professor: Richard R. Bevis; Gerald D. Cavanaugh; Frank W. Worms
Associate Professor: Gary C. Anderson; James L. Baker; John P. Conry; Ralph DeLong; Mahmoud E. ElDeeb; Kenneth M. Hargreaves; James E. Hinrichs; James R. Holtan; Ramesh K. Kuba; Thomas D. Larson; Kathleen J. Newell; Paul S. Olin; Maria R. Pintado; Nelson L. Rhodus; John K. Schulte; Stephen K. Shuman; James Q. Swift; Omar A. Zidan
Assistant Professor: Pamela R. Erickson; Bryan S. Michalowicz
Clinical Assistant Professor: Daniel E. Gatto
Clinical Dental Specialist: Chester J. Schultz, Jr.
Research Associate: John O. C. Look
Senior Psychologist: Kate M. Hathaway

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degree Offered—M.S. (Plan A only).

Curriculum—Advanced educational programs for the M.S. degree (and for clinical specialties) in the School of Dentistry include endodontics, oral pathology, oral and maxillofacial surgery, orthodontics, pediatric dentistry, periodontics, prosthodontics, and general practice residencies and programs. Other clinical and postdoctoral programs include temporomandibular disorders and craniofacial pain, operative dentistry, caries research, oral and maxillofacial radiology, geriatric dentistry, primary dental care, and the Dentist Scientist Award.

The Dentist Scientist Award (DSA), which is supported by a grant from the National Institutes of Health, provides for Ph.D. training in basic sciences and advanced education in a clinical specialty of dentistry. Individual awards are competitive. Information regarding the DSA may be obtained from the principal investigator, Dr. Mark Herzberg, or the director of graduate studies.

Clinical Instruments—The School of Dentistry Dental Clinics maintain a centralized instrument usage and sterilization system that provides clinical instrumentation and related services for graduate students. Usage fees, where applicable, are listed in the quarterly Class Schedule.

Prerequisites for Admission—A D.D.S. degree (or its foreign equivalent) from an accredited school of dentistry, with a B average or better or with academic standing in the top fourth of the applicant’s graduating class is required.

Master’s Degree Requirements—Programs are designed by the individual areas of specialization in the major subject within the Graduate School’s minimum credit and distribution requirements. Students may elect to take a minor or related fields in nonclinical fields in consultation with their adviser. A final oral examination is required.

Language Requirements—Proficiency in a language in addition to English is required for individuals specializing in oral pathology.

Minor Requirements for Students Majoring in Other Fields—Graduate study related to dentistry and leading to the M.S. and Ph.D. degrees may also be pursued through majors in such allied sciences as anatomy, biochemistry, microbiology, oral biology, pathobiology, pharmacology, and physiology. A Ph.D. program in one of the above fields with a minor in dentistry is offered to qualified dental graduates.

For Further Information and Applications—Contact the Director of Graduate Studies or the main office, School of Dentistry, University of Minnesota, 15-238 Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612/625-9982).

Dent 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)

Dentistry (Dent)

Dent 5945. Geriatric Hospital Dentistry. (Cr ar may be repeated for cr; 4 cr required) Shuman Rotations at University of Minnesota Hospital Dental Clinic and/or Minneapolis V.A. Medical Center Dental Clinic. Management of elderly patients in acute care settings. Dental management of patients compromised by medical therapies such as radiation treatment or chemotherapy, as well as those with acute illnesses.
**Dent 5950, 5951, 5952, 5953. Advanced General Dentistry Seminar I, II, III, IV.** (Cr ar) Martens
Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

**Dent 5960, 5961, 5962, 5963, 5964, 5965, 5966, 5967. Advanced General Dentistry Clinic I, II, III, IV, V, VI, VII, VIII.** (Cr ar) Martens
Comprehensive oral healthcare delivered in variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

**Dent 5970, 5971, 5972, 5973. General Practice Seminar I, II, III, IV.** (Cr ar) Martens
A sequence of lectures, discussions, and seminars on topics related to current dental practice. Correlated with clinical experiences.

**Dent 5974, 5975, 5976, 5977. General Practice Clinical Administration I, II, III, IV.** (Cr ar) Martens
Field experience in hospital dental clinic administration for residents.

**Dent 5980, 5981, 5982, 5983, 5984, 5985, 5986, 5987. General Practice Clinic I, II, III, IV, V, VI, VII, VIII.** (Cr ar) Martens
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

**Dent 5989. Advanced Clinical Geriatric Dentistry.** (Cr ar) Shuman
Practical clinical experience in examination, diagnosis, treatment planning, and treatment of older adult patients in the dental clinic at the Amherst H. Wilder Senior Health Center.

**Dent 5990. Field Experience: Administration in a Multidisciplinary Health Center.** (Cr ar) Shuman
Administrative and management concerns related to development of dental service in multidisciplinary care facility for older adults. Field placement at the Amherst H. Wilder Senior Health Clinic and affiliated residences.

**Dent 5992-5993-5994. Oral Health Services for Older Adults.** (Cr ar) Shuman
A series of seminars for graduate students on broad variety of topics related to aging, oral health of older adults, and delivery of oral health services to older adults. Students present articles, complex clinical cases, and ongoing research projects for group discussion.

**Dent 5955, 5956, 5957, 5958. Advanced General Dentistry Clinical Administration I, II, III, IV.** (Cr ar) Martens
Field experience in community dental clinic practice and administration.

**Dent 5996. Psychological Issues in Medical and Dental Patient Management.** (2 cr; prereq #; offered alt yrs) Hathaway
Psychological issues interfacing with medical and dental evaluation and treatment, psychopathology, stress, and illness.

**Dent 8126. Teaching and Evaluation in Dentistry I.** (3 cr; prereq #; offered alt yrs) Born
Application of educational and psychological principles to professional dental education. Theoretical principles of behavioral and cognitive psychology applied to topics appropriate to dental education. Students apply these principles to concrete instructional situations in their own areas of interest and become familiar with instructional practice in both traditional and new instructional settings.

**Dent 8127. Teaching and Evaluation in Dentistry II.** (3 cr; prereq 8126; offered alt yrs) Born
Application of evaluation and measurement theory to higher education, specifically dental education. Objectives for teaching and evaluation, construction of tests and measurement instruments, analysis of tests, interpretation of test results, principles of marking.

**Dent 8400. Craniomandibular Disorders: Selected Topics.** (3 cr) Schulte
Seminar on current issues in diagnosis and treatment of craniomandibular disorders.

**Dent 8440. TMJ and Craniofacial Pain: Advanced Theory and Principles.** (3 cr; prereq #) Fricton, staff
Nature and pathophysiology of disorders causing chronic pain in TMJ and craniofacial regions; advanced principles and theory on assessment, diagnosis, and interdisciplinary management.

**Dent 8441. Seminars in TMJ and Craniofacial Pain.** (1 cr; prereq #) Fricton, staff
Advanced topics on theories and application of recently developed techniques of data collection, diagnostic strategies, and management for TMJ and craniofacial pain.

**Dent 8442. Advanced Clinical TMJ and Craniofacial Pain.** (1-4 cr; prereq #) Fricton, staff
Interdisciplinary study of patients with TMJ and craniofacial pain using techniques of assessment currently being researched; background and clinical knowledge of patient synthesized with respect to current literature on management; management program is developed, discussed with faculty, and implemented; effects of treatment and compliance reviewed at each follow-up appointment.

**Dent 8443. Current Literature in TMJ and Craniofacial Pain.** (1 cr; prereq #) Fricton, staff
Review of current literature in TMJ and craniofacial pain and how it relates to past literature, theories on pain, and philosophies of management.

**Endodontics (Endo)**

Endo 5300f, 5301w, 5302s, 5303su, 5304f, 5305w, 5306s. Advanced Clinical Endodontics. (Cr ar) M E ElDeeb
Diagnosis and treatment of clinical cases. Students are assigned complex cases and explore new and unique techniques.

Endo 5310f, 5311w, 5312s, 5313su, 5314f, 5315w, 5316s. Endodontic Emergency Problems. (1 cr per qtr) M E ElDeeb
Each student is assigned a one-week period (8 hours per day) and is responsible for all emergencies in the Endodontic Clinic during this time.
Endo 5330f, 5331w, 5332s, 5333su, 5334f, 5335w, 5336s. Review of Cases. (1 cr per qtr) M E ElDeeb
Students present cases for review by endodontic faculty and other graduate students.

Endo 8004su. Research in Endodontics. (Cr ar) M E ElDeeb
Organized literature review in area of specific interest of student, selection of thesis project, and completion of research and thesis.

Endo 8310f, 8311w, 8312s, 8313su, 8314f, 8315w, 8316s. Seminar: Endodontics. (2 cr per qtr) M E ElDeeb
Review of current literature, research, and clinical cases. Sessions assigned to student.

Endo 8320f, 8321w, 8322s. Advanced Endodontic Lectures. (1 cr per qtr) M E ElDeeb
Pulpal and periapical pathology, diagnosis, and treatment planning in endodontics.

Endo 8335. Endodontic-Periodontic Seminar. (1 cr) M E ElDeeb
Discussions of endodontic-periodontic problems for all graduate dental students.

Oral Biology (OBio)
See the separate major heading Oral Biology later in this bulletin.

Oral and Maxillofacial Surgery (OSur)

OSur 5257. Ambulatory General Anesthesia. (1 cr) Swift
A clinical rotation involving experience in outpatient management and using intravenous sedation and general anesthesia.

OSur 5276. Medicine for the Oral Surgeon. (2 cr; prereq participation in oral surgery residency program) Swift
Six-week rotation at Mt. Sinai Hospital on medical service under direction of University’s Internal Medicine Department. Rotation involves workup and admission and daily management of patients on medical service.

OSur 5277. Physical Diagnosis for Oral Surgery Residents. (1 cr; prereq participation in oral surgery residency program) Swift
Six-week didactic course coupled with evaluation of patients at University Hospital under direction of Department of Medicine and its faculty.

OSur 8250. Advanced Oral and Maxillofacial Surgery. (Cr ar) Swift
Assigned clinics in the University of Minnesota Hospital and Clinic, Veterans Administration Medical Center, Hennepin County Medical Center, and School of Dentistry.

OSur 8251. Seminar: Oral Surgery. (1 cr) Swift
Oral surgical subjects.

OSur 8253. Problems in Oral and Maxillofacial Surgery. (Cr ar) Swift
Current literature review; experience in surgical techniques.

OSur 8254. Topics. (1 cr) Swift
Surgical orthodontic techniques and seminar.

OSur 8255. General Surgery. (Cr ar)
Clinical rotation on general surgical service at the University of Minnesota Hospital and Clinic. Seminars, clinics, and operating room experience.

Oral Pathology (OPat)

OPat 5017. Oral Pathology Clinic. (Cr ar) Vickers
Resident participates in management of Oral Pathology Clinic patients at the School of Dentistry and serves as oral pathology consultant with designated staff in school’s screening facilities.

OPat 8004. Histopathology. (2 cr) Vickers
Weekly presentation of currently encountered diagnostic material. Evaluation and interpretation by trainees of individual and representative material. Additional diagnostic information, such as clinical and radiologic information, is collated as an introduction to the individual problem of diagnosis when possible. Cases chosen in advance and made available for individual study.

OPat 8006. Current Literature Review. (1 cr) Gorlin, Vickers
Seminars on a variety of research problems, topics, and areas of special interest between graduate students and oral pathology faculty. Students expected to determine both subjects for discussion and nature of discussions.

OPat 8007. Special Oral Pathology. (2 cr) Gorlin, Vickers
Review of the clinical, radiographic, and treatment aspects of oral disease and oral manifestations of systemic disease. For residents and graduate students in disciplines other than oral pathology.

OPat 8011. Surgical Oral Pathology. (Cr ar) Vickers
Residents and graduate students participate as staff assistants in diagnosis of oral diseases. Histopathologic, frozen section, clinical, cytologic, cytopathic, microbiologic, hematologic, radiologic, and other diagnostic means are used.

OPat 8300f. Human Development Genetics I. (2 cr; prereq GCB 3022, BioC 5970, Path 5101 or #)
Genetic and genetic-environmental interactions in development of normal and abnormal human traits. Genetic control of prenatal and postnatal differentiation at the cellular tissue level. Morphological and functional (behavioral) human traits, especially those affecting the face and oral structures.

Oral Radiology (ORad)

ORad 8300. Advanced Oral Roentgenographic Interpretation. (2 cr; prereq #) Kuba
Theory, principles, and practice of roentgenographic interpretation of introral and extraoral roentgenograms. Normal roentgenographic anatomy and roentgenographic evidence of the presence of pathology and anomalies integrated with relevant anatomical, pathological, clinical, and statistical data in establishing differential, provisional and final diagnoses, prognoses, treatment plans, and treatment.
**Orthodontics (Otho)**

Otho 5001, 5002, 5003, 5004. Clinical Orthodontics. (Cr ar) Speidel, staff
Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision.

Otho 8001. Research in Orthodontics. (Cr ar) Speidel, Viazis, staff

Otho 8200, 8201, 8202, 8203. Growth and Development. (Cr ar) Speidel, staff
Head growth, development, osteology, and myology. Both normal and abnormal morphology and function, with emphasis on cephalometric methods.

Otho 8204, 8205, 8206, 8207. Orthodontic Diagnosis and Treatment Planning. (Cr ar) Speidel, staff
Etiology, treatment, and prognosis of clinical orthodontic problems.

Otho 8208, 8209, 8210, 8211. Orthodontic Seminar. (Cr ar) Speidel, staff
Current literature, research, implications.

Otho 8217, 8218s, 8219s. Topics in Orthodontics. (Cr ar) Speidel, staff

**Pediatric Dentistry (Pedo)**

Pedo 5414. Advanced Clinical Pedodontics. (Cr ar)
Assignment of patients for treatment of difficult or unusual pedodontic problems under direct faculty supervision.

Pedo 8001. Research in Pediatric Dentistry. (Cr ar)

Pedo 8290, 8291. Hospital Pedodontics I, II. (Cr ar)
Faculty-supervised diagnosis and treatment of pedodontic problems at Hennepin County Medical Center. Participation on a rotation basis in seminars in pediatrics and anesthesia. Preoperative and postoperative seminar discussion and evaluation of treatment plans.

Pedo 8292. Pedodontic Literature. (Cr ar)
In-depth literature review and seminar discussion of specific pedodontic topics.

Pedo 8293. Advanced Pedodontic Techniques. (Cr ar)
Description of and exercises in advanced pedodontic skills and techniques.

Pedo 8294. Pedodontic Diagnosis and Treatment Planning. (Cr ar)
Systematic approach to diagnosis of and treatment planning for various pedodontic problems.

Pedo 8295. Independent Pedodontic Study. (Cr ar)
Preparation of a position paper on assigned topic, including review of pertinent literature.

**Periodontics (Pero)**

Pero 5123. Periodontal Practice Management. (1 cr; prereq Dent grad student)
Seminar on practice styles, referral patterns, third-party carriers, and management of employees.

Pero 5222f. Dentistry and Systemic Healthcare. (1 cr; prereq Dent grad student) Hinrichs, Rhodes
Seminar for improving dentist’s knowledge about treating medically compromised patients. Cardiac murmurs, coagulation, diabetes mellitus, organ transplants, hypertension, radiation and chemotherapy for oncology patients, and control of transmissible diseases.

Pero 5321. Periodontics/Orthodontics. (1 cr; prereq Dent grad student)
Combined therapeutic effect of periodontics and orthodontics to treat malocclusions that exhibit periodontitis.

Pero 8000f, w, s, su. Advanced Clinical Periodontology. (Cr ar) Hinrichs, Michalowicz, Pihlstrom, Schaffer, Wolff
Clinical training in examination, diagnosis, treatment planning, and various phases of prevention and treatment of patients with periodontal disease.

Pero 8200f, w, s, su. Clinical Seminars in Periodontology. (Cr ar) Hinrichs, Michalowicz
Clinical cases are discussed from a diagnostic, treatment planning, and therapeutic viewpoint.

Pero 8220f. Topics in Conscious Sedation. (2 cr; prereq Dent grad student) Hinrichs
Seminar for evaluating current literature. Patient selection and evaluation; approaches in oral, inhalation, and intravenous sedation; and management of medical emergencies for dental patients.

Pero 8250su. Supporting Structures of the Teeth. (Cr ar) Schaffer
Gingival tissues, cementum, periodontal ligament, and alveolar bone discussed from a histological, physiological, and pathological point of view.

Pero 8300f, w, s, su. Seminar: Periodontology. (Cr ar) Baldwin, Hinrichs, Michalowicz, Pihlstrom, Schaffer, Wolff
Discussion of assigned weekly literature reviews. Preparation of assigned formal literature reviews.

Pero 8305s. Periodontic-Prosthodontic Seminar. (1 cr; offered alt yrs) Hinrichs
Discussions of periodontal-prosthodontic problems for all graduate dental students.

Pero 8335. Dental Implantology: A Multidisciplinary Offering. (2 cr; prereq Dent grad student; offered alt yrs) Hinrichs, Michalowicz
Theories and techniques associated with implants in managing partially or completely edentulous patients; contributions from periodontology, prosthodontics, and oral-maxillofacial surgery.
Pero 8400w, s. Anatomy of Normal and Observed Periodontium. (2 cr; prereq Dent grad student; offered alt yrs) Schaffer
Discussions on histopathological alterations and regenerative potential of periodontium.

Pero 8450. Bacteriology and Immunology of Periodontal Diseases. (1 cr; prereq Dent grad student; offered alt yrs) Wolff
Discussions of etiology of periodontal diseases from a genetic, bacterial, and immunological perspective.

Prosthodontics (Pros)

Pros 5010. Graduate Prosthodontics Seminar. (2 cr per qtr [max 12 cr]; prereq Pros grad student)
Various topics discussed during first two years of program.

Pros 8003. Advanced Technical Restorative Dentistry. (Cr ar [may be repeated for cr]; Goodkind Clinical and technological theories and practices interrelated in an effort to solve more complex problems in restorative therapy.

Pros 8005. Advanced Clinical Prosthodontics I. (Cr ar [may be repeated for cr]; Goodkind Practical clinical experience in examination, diagnosis, treatment planning, and various phases of treatment of patients with restorative dental problems. New and/or unfamiliar concepts and techniques emphasized.


Pros 8032. Principles of Maxillofacial Care. (Cr ar [may be repeated for cr]; prereq #; Schreiner Treatment biomechanics and technical procedures associated with fabrication, fitting, and servicing of various types of oral and facial restorations.

Pros 8034. Advanced Clinical Maxillofacial Prosthetics. (Cr ar [may be repeated for cr]; prereq 8030, 8032, #; Schreiner Factors involved in diagnosis and organization of a treatment plan for maxillofacial patient and practical experience in associated clinical and lab procedures.

Design, Housing, and Apparel

Regents’ Professor: Joanne B. Eicher
Professor: William J. Angell; Marian-Ortolf Bagley (emeritus); Timothy T. Blade; Marilyn R. DeLong; Denise A. Guerin; Earl W. Morris (emeritus)
Associate Professor: Becky L. Yust, head; Edward G. Goetz, director of graduate studies; Homa Amir-Fazli; Margaret K. DiBlasio; Ann M. Erickson; Evelyn M. Franklin (emeritus); Kim K. P. Johnson; Wanda W. Olson; Gloria M. Williams
Assistant Professor: Sherri Gahring; Delores A. Ginthner; Karen L. LaBat; Barbara E. Martinson

Other: Suzanne J. Baizerman; David T. Grimsrud; Brad Hokanson

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—M.A. (Plan A and Plan B), M.S. (Plan A and Plan B), and Ph.D.

Curriculum—Emphases are in apparel, design communication, interior design, and housing. Concentrated study in apparel includes the history, design, and aesthetics of clothing; museology; textile and apparel product analysis; and the social science aspects of textiles and apparel. Focus in design communication is on the design process and involves concentrations in design practice; color theory and technology; and the history of design and of the decorative arts. Concentrations in interior design focus on the application of the design elements to interior environments and includes aesthetics, energy consumption, and health and safety issues. Study in housing prepares students for careers in state and federal agencies, non-profit community organizations, and housing management and regulation. Concentrations include the analysis of designed environments and technology; policy and community development; and housing for special populations.

Note—In 1992, department course numbers were changed. The designators Dsgn, Hsg, and TexC were changed to DHA effective winter quarter 1994. Please contact the department for further information.

Prerequisites for Admission—Individuals must have adequate undergraduate education in the area of emphasis and background in the basic disciplines of art, social science, physical science, and biological science appropriate to the area of emphasis. Specific requirements may be obtained by contacting the director of graduate studies.

Special Application Requirements—Consult the director of graduate studies; scores from the Graduate Record Examination are required. Students are admitted each quarter.

Degree Requirements—For the master’s degree, the minimum course credit requirement is 28 for Plan A and 40 for Plan B. For the Ph.D., the minimum course credit requirement is 57 credits.
Consult the director of graduate studies for further information. A final oral examination is required.

Language Requirements—Determined by the graduate faculty in the area of emphasis or the adviser in consultation with the student.

For Further Information and Applications—Contact the Director of Graduate Studies, Design, Housing, and Apparel, University of Minnesota, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612/626-1219; fax 612/624-2750; e-mail dhtagradinfo@che2.che.umn.edu).

DHA 8666. Doctoral Pre-Thesis Credits. (max 18 cr per qtr; doctoral student who has not passed oral prelims)

DHA 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)

DHA 8888. Thesis Credits: Doctoral. (36 cr required)

Design, Housing, and Apparel (DHA)

DHA 5101. Introduction to Design, Housing, and Apparel Research. (4 cr; prereq grad student or # Goetz

DHA 5103. Field Study: National/International. (1-15 cr; prereq #)

DHA 5105. History of Visual Communication. (4 cr; prereq art history course) Martinson

DHA 5107. History of Decorative Arts: Textiles. (3 cr, §§Dsgn 5107, §§Dsgn 5507; prereq Arch 3411, Arch 3412 or ArtH 1002 or # Erickson

DHA 5109. History of Decorative Arts: Ceramics, Metal, and Glass. (3 cr, §§Dsgn 5109, §§Dsgn 5509; prereq Arch 3411, Arch 3412 or ArtH 1002 or # Blade

DHA 5112. History of European Furniture and Interiors. (3 cr, §§Dsgn 5112, §§Dsgn 5512; prereq Arch 3411, Arch 3412 or # Erickson

DHA 5114. History of American Furniture and Interiors. (3 cr, §§Dsgn 5114, §§Dsgn 5514; prereq 5112 or Dsgn 5112 or # Blade

DHA 5115. Twentieth-Century Interiors and Furnishings. (3 cr, §§Dsgn 5115, §§Dsgn 5515; prereq 5114 or # Erickson

DHA 5118. History of Costume: 19th and 20th Centuries. (4 cr, §§Dsgn 5118, §§Dsgn 5518; prereq 3117 or 3517 or # DeLong

DHA 5170. Special Topics in Design, Housing, and Apparel. (1-4 cr

DHA 5180. Directed Study in Design, Housing, and Apparel. (1-4 cr per qtr [max 8], §§5280, §§5380, §§5480, §§5680; prereq #)

DHA 5211. Issues and Trends in Textiles and Apparel. (3 cr, §TexC 5211) Williams

DHA 5212. Clothing and Human Behavior. (4 cr, §TexC 5212; prereq jr or sr or #) Eicher

DHA 5216. Textile and Apparel Consumer. (4 cr, §TexC 5216, §TexC 5662; prereq 3216 or 3621, AgEc 1101 or Econ 1101 or #) Williams

DHA 5217. International Trade in Textiles and Apparel. (4 cr, §TexC 5217, §TexC 5685; prereq #) Williams

DHA 5218. Pattern Development III. (4 cr, §TexC 3221; prereq 3218 or TexC 3218) Labat

DHA 5231. Clothing Design Studio IV. (4 cr, §§Dsgn 5231, §§Dsgn 5541; prereq 3232, 5218, Dsgn 3232, Dsgn 5218) Amir-Fazli

DHA 5232. Clothing Design Studio V. (4 cr, §§Dsgn 5232, §§Dsgn 5544; prereq 5231 or Dsgn 5231) Amir-Fazli
**DHA 5234. Clothing Design for Special Needs.** (4 cr, §Dsgn 5234; prereq 5231 or 5541, TexC 3216 or TexC 3621; offered alt yrs) Amir-Fazli, DeLong Experimental design concepts as they relate to special market segments: physical limitations, safety protection, energy consumption. Emphasizes integration of human needs, fabric character, and garment structure.

**DHA 5241. Retail Promotion.** (4 cr, §TexC 3646, §TexC 5241; prereq 1211 or TexC 1211, Mktg 3000) Jo johnson Marketing communication theory, concepts, and research with in-depth treatment of elements of retail promotion mix: advertising, sales promotions, point-of-purchase communication, direct marketing.

**DHA 5242. Managerial Decision Making.** (4 cr, §TexC 5242; prereq 3646 or 5241; offered alt yrs) Jo johnson Decision making in retail situations, including merchandise planning and management of sales and human resources.

**DHA 5254. Performance Evaluation: Fabrics and Garments.** (5 cr, §TexC 5254, §TexC 5627; prereq 3216 or TexC 3216; offered alt yrs) LaBat Testing procedures, standards, and specifications used in designing and purchasing fabrics and garments. Application of test results to design and specification of garments.

**DHA 5266. Ethnic Dress.** (3 cr, §TexC 5266, §TexC 5668; prereq 3212 or 3661, Anth 1102, Soc 1001 or #) Either Sociocultural analysis of ethnic dress (appendix, accessories, and body modification) emphasizing cultural patterns of technology, aesthetics, ritual, morality, and symbolism. External and internal influences encouraging change.

**DHA 5289. Problems in Design: Costume.** (3-4 cr per qtr [max 12 cr], §Dsgn 5289; prereq dsgn or hsg or apparel major) Independent study under tutorial guidance.

**DHA 5323. Design Process: Drawing III.** (4 cr; prereq 3323 or 3523 or #) Martinson Application of design principles to advanced drawing problems.

**DHA 5325. Design Process: Two-Dimensional Design III.** (4 cr; prereq 3325 or grad student; A-F only) Martinson Students complete design projects and examine design and visual perception research literature.

**DHA 5328. Color and Design.** (4 cr, §Dsgn 5328, §Dsgn 5528; prereq 1328 or 1528 or #) Martinson Color concepts and their application to design.

**DHA 5331. Surface Fabric Design III.** (4 cr, §Dsgn 5331, §Dsgn 5531; prereq 3331 or 3531, pass portfolio review, dsgn or hsg or apparel major) Designing in one special surface textile technique. Studio problems. Readings.

**DHA 5332. Fiber Structure: Weaving II.** (4 cr, §5532; prereq 3332 or 3532; University College only) Advanced loom weaving; pattern weaves and color.

**DHA 5334. Computer Applications to Design Problems II.** (4 cr; prereq 3334 or #) Solving design problems primarily using Macintosh computers. Using software to combine images and print and explore color and desktop publishing.

**DHA 5337. Fiber Structure Design: Quilting.** (4 cr, §5537; prereq pass design comm portfolio review; University College only) Applying color and design principles using patchwork and quilting techniques.

**DHA 5350. Advanced Typographic Design.** (4 cr; prereq 3350, 3351 or #) Layout, design, letterforms, and typefaces.

**DHA 5384. Interactive Media.** (4 cr, prereq 5334 or #) Solving design problems involving interactive media and computer programs. Using software to create interactive presentations primarily using Macintosh computers. Hypermedia, scripting, video and sound editing, animation, and digital output.

**DHA 5461. Housing Management.** (5 cr, §Hsg 5461, §Hsg 5861; prereq 1101, 3463 or #) Management of multiunit housing. Historical perspectives, current status of housing, management approaches, psychosocial impact of housing and community design, specific residential populations. Students conduct post-occupancy evaluation of housing complex.

**DHA 5463. Housing Policy.** (3 cr, §Hsg 5463, §Hsg 5863, §PA 5611; prereq grad student or adult spec or 3463 or 3863) Goetz Role of American national, state, and local government in financing, control, taxation, and construction of housing.

**DHA 5465. Housing in World Perspective I.** (4 cr, §Hsg 5465, §Hsg 5865; prereq 3463 or 3863 or #) Social analysis of housing around world; emphasizes population, environment, and social organization of nations as contexts for national policy and for housing choices of households.

**DHA 5467. Housing and the Social Environment.** (4 cr, §Hsg 5467, §Hsg 5867; prereq 1101, 3463 or 5863 or #) Yust Housing choices of households; emphasis on special needs of the elderly, the disabled, minorities, large families, and female-headed households.

**DHA 5481. Designed Environments for Aging.** (4 cr, §Hsg 5481, §Hsg 5881; prereq 3463 or 3863 or Dsgn 1555 or Dsgn 1642 or #) Yust Design of environments with potential to compensate for deficits in physical and mental functioning. Older adults and barrier-free, flexible, and responsive physical environments.

**DHA 5482. The Family and Energy Issues.** (3 cr, §Hsg 5482, §Hsg 5861; prereq 1400 or 1851, 1401 or 1801 or #) Yust Analysis of family behavior as it relates to energy use, impact of scarcity on quality of family functioning, family energy issues in future.
DHA 5483. Housing Discrimination. (4 cr; prereq 3463 or #; A-F only; offered alt yrs) Goetz
Causes, effects, and patterns of housing segregation and discrimination; public policies aimed at addressing problems.

DHA 5485. Homelessness. (5 cr, §Hsg 5485; offered alt yrs) Goetz
Causes of homelessness in contemporary times; subpopulations among the homeless; public policies aimed at addressing the problem.

DHA 5612. Interior Design Research. (2 cr, §Dsgn 5575, §Dsgn 5612; prereq 3553 or 3643 or #) Guerin
Examination and development of studies.

DHA 5634. Interior Design Codes and Environmental Issues. (3 cr; A-F only; offered alt yrs)
Impact of environmental issues, legislation, and social awareness on designing for life safety, health, diverse populations, and earth’s resources.

DHA 5644. Interior Design Studio IV. (6 cr, §5553; prereq 3643 or 3553, ∆ offered alt yrs)
Solving design problems using an interdisciplinary team approach.

DHA 5645. Interior Design Studio V. (4 cr, §Dsgn 5552, §Dsgn 5645; prereq DHA 3216 or TexC 3621, DHA 3631 or Dsgn 3557, DHA 3633 or Dsgn 3548, DHA 3643 or Dsgn 3553, # Erickson, Guerin
Advanced problems related to residential spaces.

DHA 5646. Interior Design Studio VI. (4 cr, §Dsgn 5554, §Dsgn 5646; prereq DHA 3216 or TexC 3621, DHA 3631 or Dsgn 3557, DHA 3633 or Dsgn 3548, DHA 3643 or Dsgn 3553, # Ginthner
Advanced problems related to nonresidential spaces.

DHA 5647. Interior Design Thesis. (6 cr, §Dsgn 5555, §Dsgn 5647; prereq 5575 or 5612, 5552 or 5645, 5554 or 5646)
Comprehensive independent project generated from research conducted in Dsgn 5612.

DHA 8101. Philosophy of Design and Human Interaction. (3 cr, prereq DHA grad student or #)
Philosophical questions that arise when integrating content areas of design, housing, and apparel. Builds on interdisciplinary approaches to problem analysis of designed environment.

DHA 8102. Theoretical Orientations in Design, Housing, and Apparel. (4 cr; prereq 5101 or equiv, 8101 or #; offered alt yrs) Williams
Development and current status of theoretical and practical knowledge. Intra- and interdisciplinary relations to philosophical perspectives and needs of practitioners in everyday settings.

DHA 8103. Advanced Research Methods in Design, Housing, and Apparel. (4 cr; prereq stats course)
Developing skills in analysis and interpretation of data, application of theories in research, and reporting of results; using statistical packages.

DHA 8110. Design Education. (3 cr)
Educational processes and methods, including studios, in design disciplines. Learning styles, criticism, evaluation, and curriculum development.

DHA 8111. Literature of Design. (3 cr) Guerin, Martinson
Seminar focusing on visualization, creativity, and design method literature and student-generated issues.

DHA 8170. Special Topics in Design, Housing, and Apparel. (1-4 cr per qtr)
In-depth investigation of specific topic, announced in advance.

DHA 8180. Directed Study in Design, Housing, and Apparel. (1-4 cr per qtr [max 8 cr]; prereq #)
Independent study under tutorial guidance.

DHA 8181. Integrative Seminar. (1 cr)
Ideas, issues, and trends in design, housing, and apparel.

DHA 8190. Readings in Design, Housing, and Apparel. (1-4 cr per qtr [max 8 cr]; prereq #)
Independent study and review of books and periodicals useful for individual programs but not available in other courses.

DHA 8262. Literature of Dress I. (3 cr, §TexC 8662; offered alt yrs) Eicher, Johnson
Orientation to classic historical readings; basis for key ideas.

DHA 8263. Literature of Dress II. (3 cr, §TexC 8663; offered alt yrs) Williams
Orientation to contemporary readings; basis for key ideas.

DHA 8264. Innovation Theory and Analysis. (3 cr; prereq #; offered alt yrs) DeLong
Theories and factors influencing adoption and diffusion of design products, including fashion. Methodologies used in analysis of the diffusion process.

DHA 8266. Aesthetic Concepts Related to Apparel Design. (3 cr, §TexC 8666; prereq 3217 or #; offered alt yrs) DeLong
Comprehensive survey and application of theory to the analysis of clothing design. Development of a methodology for visual perceptual evaluation.

DHA 8268. Methodological Orientations in Clothing and Human Behavior. (4 cr, §TexC 8668; prereq 8267, HEEd 8300, HEEd 8305 or equiv or #; offered alt yrs) Williams
Alternative methodological perspectives interrelated with theoretical streams in clothing and human behavior; orientation to knowledge use and evaluation in practical settings.

DHA 8323. Design Process: Drawing. (4 cr, §Dsgn 8523; prereq #) Martinson
Drawing media as applied to design problems.

DHA 8325. Design Process: Two-Dimensional Design. (4 cr, §Dsgn 8525; prereq #) Martinson
Experiments with principles of two-dimensional design; emphasis on alternative solutions to design problems.
DHA 8328. Design Process: Color. (1-4 cr, §Dsgn 8528; prereq #; A-F only) Martinson
Color concepts and their application to design.

DHA 8467. Housing Theory. (3 cr; prereq 5101, 5467 or #; offered alt yrs) Yust
Theories applied to study of housing behavior of households.

DHA 8671. Interior Design Criticism and Theory. (3 cr; A-F only)
Design theories examined to establish framework for criticism. Field investigation in Twin Cities to develop critical inquiry methods.

DHA 8676. Environmental Studies in Interior Design. (4 cr, §Dsgn 8556; prereq 6 cr interior design or #)
Human needs as related to interior design.

Human Ecology (HE)
HE 5003. Field Experience. (1-5 cr per qtr [max 15 cr]; prereq #; Yust)
Directed preprofessional work experience in home economics position in business or industry, government, or other appropriate organization.

HE 5130. Independent Study in Home Economics. (1-5 cr [max 16 cr]; prereq #; Yust)

Development Studies and Social Change (DSSC)

Regents' Professor: Vernon W. Ruttan (agricultural and applied economics)
Professor: Raymond D. Duvall (political science), director of graduate studies; Ronald R. Aminzade (sociology); Vernon B. Cardwell (agronomy and plant genetics); William P. Cunningham (genetics and cell biology); Allen F. Isaacman (history); Robert T. Kudrle (public affairs); Philip W. Porter (geography); David R. Roediger (history); Eric S. Sheppard (geography); Anthony M. Starfield (ecology, evolution, and behavior)

Associate Professor: Jean Allman (history); Lisa J. Disch (political science); Susan N. G. Geiger (women's studies); Amy K. Kaminsky (women's studies); Anne R. D. Kapuscinski (fisheries and wildlife); Daniel R. Kelliher (political science); John W. Mowitt (cultural studies and comparative literature); August H. Nitzm, Jr. (political science); Joanna O'Connell (Spanish and Portuguese); Abdul I. Samatar (geography); Kathryn A. Sikkink (political science); Ann B. Waltner (history); John S. Wright (Afro-American and African studies)

Assistant Professor: Ragui Assaad (public affairs); Jeffrey P. Broadbent (sociology); Leola A. Johnson (American studies); Lisette E. Josephides (anthropology); Deborah Levison (public affairs); Jennifer L. Pierce (sociology); Charles Ben Pike (Afro-American and African studies)

Course of Study—Minor in development studies and social change, applicable to doctoral programs only.

Curriculum—A structured interdisciplinary graduate minor in development studies and social change is offered in conjunction with the MacArthur Interdisciplinary Program on Peace and International Cooperation. The minor program focuses on three major areas: 1) the relationships between macroscopic processes of political, economic, and social change, and the microscopic conditions of lived experience in the developing world; 2) specifically interdisciplinary perspectives (encompassing the social sciences, the biological sciences, and the humanities) on this general thematic concern; and 3) preparation of doctoral students for field research in the developing world.

Prerequisites for Admission—Admission to the graduate minor in development studies and social change is contingent upon prior admission to a doctoral degree-granting program within the Graduate School and upon affiliation with the MacArthur Program.

Special Application Requirements—Students enrolled in a doctoral degree-granting program may apply for the minor at any time during the academic year; acceptance will take effect the following term.

Minor Requirements—A sequence of three core seminars in development studies and social change (totaling ten credits) is required. In addition, students take two or three courses (totaling eight credits) chosen from an approved list, from across the Graduate School curriculum, which are relevant to the field of development studies and social change.

Language Requirements—None specific to the minor program.

For Further Information and Applications—Contact the MacArthur Interdisciplinary Program on Peace and International Cooperation, University of Minnesota, 260 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612/624-0832; fax 612/626-2242; e-mail macarth@tc.umn.edu).

DSSC 8110s. Approaches to Knowledge and Truth: Defining Ways of Knowing in Development Studies and Social Change. (3 cr; prereq DSSC minor student or #)
Approaches as practiced by physical, biological, and social scientists and scholars in the humanities. “Ways of knowing” as practiced in different cultures or by different groups within cultures. Team taught by faculty from biological and social sciences and the humanities.
DSSC 8210-8211-8212. Field Research Methodology in Development Studies and Social Change. (1 cr per qtr; prereq DSSC minor student or #)
Identification of potential funding sources for field research and the writing of grant proposals. Preparing for and conducting field research. Students take this course during the year before undertaking field research, typically the third year of graduate study.

DSSC 8310F, 8311w. Topics in Development Studies and Social Change. (2 cr per qtr; prereq DSSC minor student or #)
Offered in conjunction with MacArthur Program on Peace and International Cooperation workshop series.

East Asian Languages, Literatures, and Linguistics

Professor: Yu-shih Chen (Chinese); Chun-Jo Liu (emeritus: Chinese); Richard B. Mather (emeritus: Chinese); Stephen S. Wang (Chinese)
Associate Professor: Polly E. Szatrowski (Japanese), Ann B. Waltner (Chinese; history)
Assistant Professor: Sarah Jane Pradt (Japanese)
Lecturer: Hong Li (Chinese)

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—Chinese: M.A. (Plan A and Plan B) and Ph.D. Japanese: M.A. (Plan A and Plan B) and Ph.D. See also East Asian Studies following this listing.

Curriculum—Chinese: Two areas of concentration are available—literature and linguistics. Programs may include courses from both of these areas, but must minimally fulfill the core requirements for one of them, as determined in consultation with the student’s adviser. Areas of subspecialty in the literature concentration include medieval, early modern, and 20th century. Areas of subspecialty in Chinese linguistics include aspects of synchronic and diachronic studies of Chinese.

Japanese: Two areas of concentration are available—literature and linguistics. Programs may include courses from both of these areas, but must minimally fulfill the core requirements for one of them, as determined in consultation with the student’s adviser. Areas of subspecialty in the literature concentration include medieval, Tokugawa, modern and contemporary, modern drama, and modern literary theory and criticism. Areas of subspecialty in the linguistics concentration include aspects of the phonology, syntax, semantics, discourse structure, pragmatics, and history of Japanese.

Prerequisites for Admission—Normally, an undergraduate major in Chinese or Japanese is the prerequisite for graduate studies. Students from other academic areas may be admitted with the provision that prerequisite coursework be made up after admission.

Special Application Requirements—Three letters of recommendation and a statement of purpose should be submitted to the department. Graduate Record Examination General Test scores (verbal and quantitative sections) are required; a minimum score of 550 on the Test of English as a Foreign Language (TOEFL) is required for applicants whose native language is not English. Students normally are admitted in fall quarter of each academic year. To be considered for financial aid, completed applications must be received by the first week of January.

Master’s Degree Requirements—A complete list of degree requirements may be obtained from the director of graduate studies. A final oral examination is required.

Doctoral Degree Requirements—Programs are designed by the student and the adviser, with approval from the director of graduate studies, to provide a coherent course of study in an area of concentration. A complete list of requirements may be obtained from the director of graduate studies.

Language Requirements—For the M.A., students are expected to have research competence in Chinese or Japanese. For the Ph.D., students are also required to complete, or demonstrate by examination an ability equivalent to, two years of Chinese or Japanese language study (whichever language is not the chosen area of concentration); they must also demonstrate a reading knowledge in one of the following: French, German, or Russian (which may be fulfilled by passing the Graduation Reading Proficiency Test offered by the relevant language program at the University of Minnesota).
Minor Requirements for Students Majoring in Other Fields—A description of minor requirements in Chinese or Japanese is available from the director of graduate studies.

For Further Information and Applications—Contact the Department of East Asian Languages, Literatures, and Linguistics, University of Minnesota, 192 Klaeber Court, 320 16th Avenue S.E., Minneapolis, MN 55455 (612/624-3331).

Chn 8666. Doctoral Pre-Thesis Credits. (max 18 cr per qtr; doctoral student who has not passed oral prelims)

Chn 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)

Chn 8888. Thesis Credits: Doctoral. (36 cr required)

Jpn 8666. Doctoral Pre-Thesis Credits. (max 18 cr per qtr; doctoral student who has not passed oral prelims)

Jpn 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)

Jpn 8888. Thesis Credits: Doctoral. (36 cr required)

Chinese (Chn)

Chn 5041-5042-5043. Third-Year Modern Chinese. (4 cr per qtr, §3041, §3042, §3043; prereq 3023 for 5041, 3031 for 5042, 3042 for 5043)

§5041: Reading and analysis of 20th century texts. §5042-5043: Reading and analysis of vernacular texts.

Chn 5051, 5052. Advanced Chinese Conversation and Composition. (4 cr per qtr, §3051, §3052; prereq 3023 or #)

To perfect conversation and pronunciation; to advance competence in grammar by exercises in composition and translation from English into Chinese. Additional work beyond that required for 3051, 3052.

Chn 5101. Contemporary Chinese Writing. (4 cr; prereq 3041)

Reading, translation, and discussion of representative works of Chinese authors since 1976.

Chn 5102. Readings in Modern Chinese Fiction. (4 cr; prereq 3041)

Reading and analysis of selected short fiction from 1918 to the present day.

Chn 5103. Pre-Modern Prose. (4 cr; prereq 3031, 3041)

Reading of representative Chinese texts of pre-modern periods.

Chn 5105. Readings in Chinese Vernacular Fiction. (4 cr; prereq 3041)

Selections from great works of traditional fiction including short stories and novels such as Journey to the West and Dream of the Red Chamber.

Chn 5165. History of Chinese Literature. (4 cr; prereq 3033, 3043)

Survey of major Chinese literary movements from emergence of early Confucian canon to May 4th movement in 1919.

Chn 5251. Structure of Standard Chinese. (4 cr; prereq 1013)

Introduction to phonological and syntactic structures of modern standard Chinese.

Chn 5252. History of the Chinese Language. (4 cr; prereq 3031, Ling 3601 recommended)

Survey using both traditional native philological sources as well as modern dialectal evidences.

Chn 5451, 5452. Studies in Chinese Linguistics. (4 cr per qtr; prereq jr or #)

Topic for each quarter chosen in advance, in consideration of students’ interests, from the following: syntax of modern standard Chinese, Chinese dialectology, Chinese historical phonology, grammar of classical Chinese.

Chn 5460. Topics in Chinese Literature. (4 cr per qtr [max 12 cr])

Reading and discussion of selected texts from all periods of Chinese civilization and from all genres—poetic, expository, narrative, or dramatic. Topics announced in advance.

Chn 5704. Early Chinese Poetry. (4 cr; prereq 5165 or #)

Reading and analysis of selected major poets and poetic forms from first anthologies through twelfth century.

Chn 5705. Chinese Fiction in the Ming and Qing. (4 cr; prereq 3033, 3043)

Contextual readings of traditional fiction, including short stories and novels such as Journey to the West and Dream of the Red Chamber.

Chn 5706. Chinese Philosophical/Historical Texts. (4 cr; prereq 3033, 3043)

Major texts in Chinese philosophy and historical tradition; Confucian/Buddhist/Taoist and other canonical writings; selections from Dynastic histories.

Chn 5970. Directed Studies. (1-4 cr; prereq #, ∆, CLA approval)

Guided individual reading for study.

Chn 8650. Seminar: Chinese Linguistics. (4 cr; prereq 5451 or 5452)

Chn 8660. Seminar: Vernacular Chinese Literature. (4 cr; prereq 5472, 5990 or #)

Consult Class Schedule for topics to be discussed during any given year.

Japanese (Jpn)

Jpn 5042. Classical Japane. (5 cr; prereq 3033)

Masterpieces of Japanese literature in classical language grammatical construction.
Jpn 5051-5052-5053. Advanced Japanese Conversation and Composition. (4 cr per qtr; §3051-3052-3053; prereq 3033 or #) Verbal expression, oral and written; grammar review; idioms and nuances; short compositions, correspondence.

Jpn 5061f-5062w-5063s. Social Science Readings. (4 cr; prereq 3053, 5051, 5052, 5053 or #) Advanced Japanese reading, discussion, and writing on topics related to newspaper/magazine articles and social science texts.

Jpn 5071f-5072w-5073s. Communication for Japan-Oriented Careers. (4 cr; prereq 3053, 5051, 5052, 5053 or #) Effective communication using spoken Japanese in contexts likely to be encountered by a career-oriented professional in Japan.


Jpn 5251. History of Japanese Language. (4 cr; prereq 3033, 5451 or #) Development of Japanese grammar from classical to modern language.


Jpn 5452. Structure of Japanese—Phonology/Morphology. (4 cr; prereq 3023, Ling 3001 or #) Generative and nongenerative approaches to Japanese sound and word structure.

Jpn 5453. Structure of Japanese Discourse/Conversational Analysis. (4 cr; prereq 3023, Ling 3001 or #) Emergence of grammar in discourse; discourse/conversational structural units, patterns, genre, strategies, style, and sociolinguistic variables.

Jpn 5460. Topics in Japanese Literature. (4 cr; prereq 3033) Topics in context of culture and intellectual history.

Jpn 5650. Proseminar: Japanese Linguistics. (4 cr; prereq 5451, 5452 or #) Selected topics from the syntax, pragmatics, lexicon, or history of Japanese language; emphasis on gathering and analysis of primary data.

Jpn 8650. Seminar: Japanese Linguistics. (4 cr; prereq 5451, 5452 or #) Research in a selected topic from the syntax, pragmatics, lexicon, or history of Japanese language; emphasis on gathering and analysis of primary data.

Jpn 8960. Seminar in Japanese Literature (Classical). (4 cr; prereq #) Intensive study of particular authors or works within the total range of the classical Japanese written literary tradition.

East Asian Studies

Professor: Edward L. Farmer (history), director of graduate studies; Mei-ling Hsu (geography); Chin-Chuan Lee (journalism and mass communication); Byron K. Marshall (history); Robert J. Poor (art history)

Associate Professor: Alan L. Kagan (music); Daniel Kelliher (political science); Ann B. Waltner (history)

Assistant Professor: Jeffrey P. Broadbent (sociology)

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—East Asian Studies: M.A. (Plan A and Plan B). See also East Asian Languages, Literatures, and Linguistics.

Curriculum—The East Asian Studies master’s program is interdisciplinary, and the student may formulate an individualized program concentration.

Prerequisites for Admission—Ideally, an applicant’s background should include undergraduate study in fields related to East Asia or East Asian languages. Students from other academic areas may be admitted, however, with the provision that prerequisite coursework be made up after admission.

Special Application Requirements—Three letters of recommendation and statement of purpose should be submitted to the department. Graduate Record Examination General Test scores are required. Students are admitted each quarter.

Master’s Degree Requirements—A complete list of degree requirements and applicable courses may be obtained from the director of graduate studies. Coursework pertaining to East Asia taken outside of East Asian studies may be applied toward the degree. A final oral examination is required.

Language Requirements—Three years of training in Chinese or Japanese (or an equivalent or greater competency) is required.
Minor Requirements for Students Majoring in Other Fields—A description of minor requirements in East Asian studies is available from the director of graduate studies.

For Further Information and Applications—Contact East Asian Studies, Area Studies Programs, University of Minnesota, 214 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612/624-8543).

EAS 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)

Area Studies (Area)

Area 5910. Topics in East Asian Studies. (2-4 cr)

Area 5970. Directed Studies. (1-15 cr per qtr; prereq #, ∆, ☐) Tutorial for qualified seniors and graduate students.

Area 5990. Directed Research. (1-15 cr per qtr; prereq #, ∆, ☐) Tutorial for qualified seniors and graduate students.

East Asian Studies (EAS)

EAS 8061. Scope and Methods of East Asian Studies. (4 cr) Introduction to subfields, problems, and methodologies involved in study of East Asia as a world area.

Ecology (EEB)

Regents’ Professor: Margaret B. Davis; Eville Gorham; Herbert E. Wright, Jr. (emeritus)

Professor: Patrice A. Morrow, head; Edward J. Cushing, director of graduate studies; Franklin H. Barnwell; Elmer C. Birney; Patrick L. Brezonik; Yosef Cohen; Kendall W. Corbin; James W. Curtsinger; David F. Grigal; Kerry R. Kelts; Scott M. Lanyon; D. Frank McKinney; Donald C. McNaught; L. David Mech; Robert O. Megard; Jean-Alex E. Molina; Craig Packer; Richard E. Phillips; Anne E. Pusey; Philip J. Regal; Peter B. Reich; Michael J. Sadowsky; William D. Schmid; Michael J. Simmons; Donald B. Smiff; Anthony M. Starfield; John R. Tester; G. David Tilman; Melbourne C. Whiteside1

Associate Professor: Donald N. Alstad; David A. Andow; John H. Beatty; Glenn R. Furnier; Linda L. Kinkel; Ruth G. Shaw; Peter W. Sorensen; Robert W. Sterner; Robert M. Zink

Assistant Professor: Georgiana May; Shahid Naeem

Adjunct Assistant Professor: Johannes M. H. Knops; John Pastor1

Research Associate: Karen S. Oberhauser

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—M.S. (Plan A and Plan B) and Ph.D.

Curriculum—Activity centers on the biology of organisms: how they interact in social groups, populations, and communities, and how those interactions have influenced the distribution of organisms in space and time. The program provides broad training across the general areas of ecology, evolution, and animal behavior, with opportunities for more specialized courses and research in behavior, evolution, population genetics, population ecology, community ecology, ecosystem ecology, and paleoecology. Opportunities exist for field research in various parts of the world as well as in local habitats. Seminars and tutorials constitute an important part of all student programs.

Prerequisites for Admission—Incoming graduate students are ordinarily expected to have completed coursework in inorganic chemistry, organic chemistry, and general physics; one year of college calculus; and at least one course each in animal biology, plant biology, genetics, biochemistry, and physiology. Proficiency in a foreign language is recommended. Deficiencies must be made up early in the graduate program.

Special Application Requirements—Students are admitted only in fall quarter. Deadline for application is January 7; earlier application is encouraged for individuals seeking financial aid. Three letters of recommendation evaluating the applicant’s scholarship are required, plus Graduate Record Examination scores (including the Subject Test). Successful applicants are encouraged to participate in the Lake Itasca Biology Session during the summer before their first quarter in residence.

Master’s Degree Requirements—Plan A requires a minimum of 20 course credits in the major, a minimum of 8 course credits in one or more related fields outside the major, and 16 thesis credits. Plan B requires the same minimum course credits as for Plan A for the major and related field(s), plus 16 additional course credits and one to three research papers, which may be written in conjunction with
graduate courses. Significant field experience and competence in statistics, to include hypothesis testing, regression, and correlation, are required. Degree programs are planned by the student and an advisory committee of three faculty to meet the student’s interests and needs. The final examination is oral.

**Doctoral Degree Requirements**—Students are expected to acquire knowledge in four areas—behavior, evolution, population and community ecology, and ecosystem ecology—through courses, seminars, and directed study. No minimum number of credits is required for the major, but at least 18 course credits are required for either a minor in another field or a supporting program in several relevant fields. Significant field experience, proficiency in using computers in research, and competence in statistics, including experimental design, are required. Degree programs are planned by the student and an advisory committee of three to five faculty.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—For master’s students, a minimum of 9 credits is required for a minor in ecology; for doctoral students, a minimum of 18 credits, distributed among several of the four areas listed under Doctoral Degree Requirements, is required.

**For Further Information and Applications**—Contact the Department of Ecology, Evolution, and Behavior, University of Minnesota, 100 Ecology Building, 1987 Upper Buford Circle, St. Paul, MN 55108 (612/625-5700; fax 612/624-6777; e-mail talston@biosci.cbs.umn.edu; http://biosci.cbs.umn.edu/eeb/ecol_grad).

**EEB 8666. Doctoral Pre-Thesis Credits.** (max 18 cr per qtr; doctoral student who has not passed oral prelims)

**EEB 8777. Thesis Credits: Master’s.** (16 cr required; Plan A only)

**EEB 8888. Thesis Credits: Doctoral.** (36 cr required)

**Community Ecology and Paleoecology**

EEB 5002. Ecology of Minnesota. (3 cr; prereq college-level biology course or #) Tester

Analysis of physical environment and of past and present ecosystems in Minnesota; influence of human activities on these ecosystems; future ecology of the state.

EEB 5004. Earth System: Geosphere/Biosphere Interactions. (4 cr, §Geo 5631; prereq Geo 3202, 3301 or #) Davis, Kelts

Interdisciplinary study of mechanisms, feedbacks, and dynamics that force global change on various time scales, using paleorecord to illustrate processes.

EEB 5008. Quaternary Ecology. (4 cr; prereq Biol 5041 or Biol 5841 or #) Cushing, Davis

Impact of changes in physical and biological environment during Quaternary period on plants and animals. Evolutionary rates, geographical distributions, community composition, and fluctuations in population sizes. Prehistoric human culture and ecosystem-level changes recorded in sedimentary sequences. Recent climatic changes. Principles of analysis, methods of investigation, and interpretation.

EEB 5014. Ecology of Vegetation. (5 cr; prereq Biol 5041 or Biol 5841, 1 qtr statistics or #) Cushing

Methods of describing, sampling, and classifying vegetation; spatial and temporal variation of vegetation on landscapes; theory of structure and dynamics of plant communities. Field trips to examine local vegetation types; analysis of quantitative data.

EEB 5016. Ecological Plant Geography. (5 cr; prereq Biol 5041 or Biol 5841, PBio 3201 or #PBio 3201 or # offered alt yrs) Cushing

Vegetation regions of the world in general and North America in detail; ecological principles of plant distribution; interpretation of regional and temporal patterns in the distribution of vegetation and taxonomic groups. Field trips to floristic regions of Minnesota.

EEB 8410. Community Ecology Seminar. (1 cr; prereq #)

Reading and discussion of recent literature on community ecology.

**Population and Evolutionary Biology**

EEB 5034. Population Genetics. (3 cr; prereq basic genetics, 1 qtr calculus, familiarity with computer programming) Curtsinger

Introduction to genetic basis of evolutionary change, including basic population genetics theory, techniques for Monte Carlo simulation of genetic evolution, and important papers in literature of experimental population genetics.

EEB 5042. Quantitative Genetics. (4 cr; prereq Biol 5003 or GCB 3022, course in statistics or #) Shaw

Genetic basis of variation in traits that are continuous, rather than discrete, in distribution and that are influenced by numerous genes, as well as environment. Assessing genetic variance and heritability of traits in populations. Predicting response to selection.

EEB 5044. Evolution. (4 cr; prereq Biol 1106 or Biol 3011, Biol 1103 or Biol 3012) Regal

Evidence for and causes of biological evolution.

EEB 5051. Analysis of Populations. (4 cr; prereq Biol 5041 or Biol 5841 or #; offered alt yrs) Siniff

Factors in regulation, growth, and general dynamics of populations. Data needed to describe populations, population growth, population models, and regulatory mechanisms.
1. The environment imposes passive stresses upon organisms—not equilibrium; various physiological adaptations allow maintenance of homeostasis.

2. Introduction to mechanistic bases of evolution, including causes and consequences of natural selection, stochastic consequences of Mendelian segregation, and their combined influences on structure of natural and captive populations. Includes lab exercises based on “Populus” computer simulation software.

3. Reading and discussion of recent literature on biology of plant and animal populations.

4. Ecological factors that influence variation in demography, social structure, and social behavior of non-human primates. Application of current evolutionary theory (e.g., kin selection, reciprocity) to understanding of social behavior.

5. Evolutionary principles applied to study of aggressive competition, mating systems, cooperation, and parental investment. Optimization models used to examine foraging strategies, predator/prey interactions and territoriality.

6. Description and analysis of events in lakes, reservoirs, and ponds, beginning with their origins and progressing through their physics, chemistry, and biology. Interrelationships of these parameters, and effects of civilization on lakes.
GRADUATE PROGRAMS

EEB 5607. Ecology of Animal Plankton. (5 cr; prereq 5601, Biol 5041 or Biol 5841 or #; offered when feasible) McNaught

EEB 5608. Ecosystems: Form and Function. (4 cr; prereq 5601 or Biol 5041 or Biol 5841 or equiv, advanced course in writing such as Comp 3015 or Comp 3027 or Comp 3033 or Comp 3085 or Rhet 3562) Gorham

EEB 5621. Limnology Laboratory. (2 cr, §Geol 5621; prereq 5601 or Geol 5601 or #) Megard
Principal techniques for obtaining information about environmental conditions in lakes and streams. Procedures for measuring abundance and population dynamics of aquatic organisms, especially plankton. Field instruments, sampling devices, chemical analyses, microscopy, and analysis of data. One Saturday field trip.

EEB 5611. Vertebrate Ecology. (5 cr; prereq college-level biol course including study of animals or #; §) Stermer
Field studies on vertebrate populations and their relationships to local environments; habitat analysis and ecological research methods. Students work as team investigating factors influencing distribution and abundance of selected vertebrates in various habitats. Research-oriented course supplemented with lectures and field trips.

EEB 5814su. Plant Community Ecology. (5 cr; prereq ecol course, §; limited to 20 students; offered annually) Christensen
Communities represented in Itasca Park and vicinity, with emphasis on vegetation. Patterns of distribution of communities, interaction with environment, dynamic relationships. Methods of community description and analysis.

EEB 5817su. Vertebrate Ecology. (5 cr; prereq ecol course, §; limited to 20 students) Christensen
Field studies on vertebrate populations and their relationships to local environments; habitat analysis and ecological research methods. Students work as team investigating factors influencing distribution and abundance of selected vertebrates in various habitats. Research-oriented course supplemented with lectures and field trips.

EEB 5834su. Field Ornithology. (5 cr; prereq general biol course including study of zoology, §; limited to 15 students) Antunes
Emphasis on breeding season, biology, and behavioral ecology of birds in Itasca State Park region. Field trips to variety of habitats to learn bird identification and to observe and practice techniques for conducting field studies. Lab sessions investigate family distinctions and species identification. Individual field projects.

EEB 5839su. Field Studies in Mammalogy. (5 cr; prereq college-level biol course including study of animals or #) Techniques used in study of small mammals. Lectures and field projects emphasizing identification, distributions, community interactions, ecophysiology, and population ecology.

EEB 5832. Ecological Genetics. (5 cr; prereq college-level course in general biol or genetics or #) Basic population and quantitative genetics; variation in natural populations; electrophoretic analysis of field samples; reconstructing phylogeny; genetic studies of population structure; introduction to mitochondrial DNA analysis.

Directed Studies

EEB 5965. Decision Analysis. (4 cr; prereq conservation biol grad student or #) Starfield
Use of decision analysis techniques and modeling to clarify issues in conservation biology; active-learning class.

EEB 5980. Directed Research. (Cr ar; prereq #, §) Lab or field investigation of selected areas of research.

EEB 8390. Graduate Seminar. (Cr ar; prereq #)

EEB 8391. Advanced Work in Ecology and Behavioral Biology. (Cr ar; prereq #) Individual work in some special aspect of the area.

EEB 8990. Graduate Research. (Cr ar; prereq #) See the Related Courses section for descriptions of the following courses:

Biol 5816. Field Biology Photography

Biol 5841. Ecology

Biol 5890. Research Problems at Itasca

Economics (Econ)

Regents' Professor: John S. Chipman; Vernon W. Ruttan
Professor: Craig E. Swan, chair; Edward Foster, director of graduate studies; S. Rao Aiyagari; Beth E. Allen; Varadarajan V. Chari; Roger D. Feldman; John F. Geweke; Edward J. Green; James S. Jordan; John H. Kareken; Alan J. A. Kazimi; John H. Kareken; Michael J. Keane; Timothy J. Kohoe; Stephen F. LeRoy; Herbert D. Malmberg; Edward C. Prescott; Marcel K. Richter; G. Edward Schuh

Associate Professor: George D. Green; Thomas J. Holmes; Nobuhiro Kiyotaki; Andrew McLennan; Richard Rogerson; Jan Werner
Assistant Professor: Gautam Gowrisankaran; Yuichi Kitamura; Ellen McGrattan; Antonio Merlo; Lee E. Ohanian; James A. Schmitz; Warren E. Weber
Other: Harold L. Cole; Jose-Victor Rios-Rull; David E. Runkle; Simran Sahi

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—Ph.D. and M.A. (Plan A and Plan B). Students are admitted only for the Ph.D.; the M.A. is an optional part of the Ph.D. program.

Curriculum—The department offers degree work in the following fields: economic theory; econometrics; economic development; financial economics; game theory; industrial organization; international economics; labor economics; mathematical economics; monetary economics; public economics.

Prerequisites for Admission—The general requirement is the capability to pursue Ph.D.-level work. Normally the student should have an undergraduate record from a recognized college that includes coursework in economic theory and mathematics (multivariate calculus and linear algebra).

Special Application Requirements—Scores from the Graduate Record Examination (GRE) and letters of recommendation must be submitted. Applicants desiring financial assistance should submit their applications, including a record of GRE scores and three letters of recommendation, to the director of graduate studies no later than December 15. Students are admitted in fall quarter only.

Master’s Degree Requirements—For Plan A, a minimum of 28 course credits (not including thesis credits) is required. For Plan B, a minimum of 44 course credits overall is required, with 20 of these credits in economics and at least 8 credits in one or more related fields (or 9 credits in a single field for a minor).

Doctoral Degree Requirements—The program does not specify a minimum number of courses required for the major, but a minimum of 18 credits outside the major is required; these may include economics courses not included in the major.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—Master’s students minoring in economics must take a minimum of 9 credits. Doctoral students minoring in economics must take six 8xxx courses and pass preliminary written examinations. All courses must be approved by the director of graduate studies in economics.

For Further Information and Applications—Contact the Director of Graduate Studies, Department of Economics, University of Minnesota, 1035 Management & Economics, 271 19th Avenue South, Minneapolis, MN 55455 (612/625-6833; fax 612/624-0209; e-mail econdgs@atlas.socsci.umn.edu; http://www.econ.umn.edu/~econdgs).

Econ 8666. Doctoral Pre-Thesis Credits. (max 18 cr per qtr; doctoral student who has not passed oral prelims)
Econ 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)
Econ 8888. Thesis Credits: Doctoral. (36 cr required)

General
Econ 5021. Economics, Ethics, and Economic Philosophy. (3-5 cr; prereq 1001, 1002 or equiv)
Literature and the issues it raises; relation of ethics to economic organization, practice, and policy. Different economic philosophies; elements involved in formulation of an economic philosophy.
Econ 5041 (formerly 5421). The Prospective World Economy. (4 cr; prereq 3101 or 3105 or #; offered when feasible)
Econ 5960. Topics in Economics. (4 cr per qtr; prereq 3101, 3102, 3103 or equiv)
Topics specified in Class Schedule.
Econ 5970. Readings in Economics. (Cr ar; prereq consent of adviser, #, ∆, CLA approval; offered when feasible)
Econ 8990. Individual Graduate Research. (Cr ar)

Theory
Econ 5107H. Honors Course: Game Theory and Its Applications. (4 cr for grad students; prereq 3101, 3102, 3103 or equiv, Math 1251-1252, Math 1261 or equiv)
Introduction to games; normal and extensive form; wars of attrition; games of timing; bargaining applications in industrial organization, macroeconomics, and international economics.
Econ 5113. Introduction to Mathematical Economics. (4 cr; prereq 3101, 3102, 3103 or equiv, Math 1251-1252, Math 1261, Math 3251 or equiv)
Development in mathematical terms of selected models of economic behavior. Topics selected to illustrate advantages of a mathematical formulation.
**GRADUATE PROGRAMS**

**Econ 5151. Elements of Economic Analysis: Firm and Household.** (3 cr; prereq 3101 or equiv, 1 qtr linear algebra, 1 qtr calculus, grad student or #) Decision making by households and by firms under conditions of monopoly, competition, and monopolistic competition.

**Econ 5152. Elements of Economic Analysis: Income and Employment.** (3 cr; prereq 3101, 3102 or equiv, 1 qtr linear algebra, 1 qtr calculus, grad student or #) Determinants of national income, employment, and price level; aggregate consumption, investment and asset holding.

**Econ 8001-8002-8003. Microeconomic Theory.** (4 cr; prereq 3101 or 5151 or equiv, 1 qtr multivariable calculus, 1 qtr linear algebra) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. 8003 may include topics such as externalities, economics of information and uncertainty, and game theory.

**Econ 8101-8102-8103. Microeconomic Theory.** (4 cr per qtr; prereq 3101 or 5151, Math 3142, Math 3211 or equiv) Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures; social welfare functions. Dynamics: stability of markets, introduction to capital theory.

**Econ 8104-8105-8106. Macroeconomic Theory.** (4 cr per qtr; prereq 3102, Math 3142, Math 3211 or equiv) 8104: Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, and prices. 8105-8106: General equilibrium models with uncertainty, search, matching, indivisibilities, private information, etc. Implications of theory for measurement and data reporting. Overlapping generations and dynasty models with money and government. Variational and recursive methods.

**Econ 8111-8112-8113. Introduction to Mathematical Economics.** (3 cr per qtr; prereq 8101, Math 3142, Math 3211 or equiv for 8111; Math 5243 recommended) Use of mathematical models in economic theory; the more standard techniques developed in 8111 and 8112; 8113 may include special topics.

**Econ 8117, 8118. Noncooperative Game Theory.** (3 cr; prereq Math 5614 or equiv or #) Solution concepts for noncooperative games in normal form, including Nash and perfect equilibrium and stable sets of equilibria. Extensive form games of perfect and incomplete information, sequential equilibrium, and consequences of stability for extensive form. Applications including bargaining and auctions.

**Econ 8119. Cooperative Game Theory.** (3 cr; prereq 8101-8102-8103, Math 5614 or equiv or #) Allen Basics of cooperative game theory, emphasizing concepts used in economics. Games with and without transferable utility; the core, the value, and other solution concepts. Recent results, including potentials, reduced games, consistency, and noncooperative implementation of cooperative solution concepts.

**Econ 8181-8182-8183. Advanced Topics in Microeconomics.** (3 cr per qtr; prereq 8103; offered when feasible)

**Econ 8184-8186. Advanced Topics in Macroeconomics.** (3 cr per qtr; offered when feasible)

**Econ 8192. Workshop in Mathematical Economics.** (Cr ar) Written and oral presentations by Ph.D. students engaged in or planning to engage in thesis research in mathematical economics.

**Econometrics**

**Econ 5211. Principles of Econometrics.** (4 cr, §3231, §5231; prereq 1101, 1102 or equiv, Stat 3011-3012 or equiv, 1 qtr calculus, familiarity with computers) Data analysis and quantitative methods in economics. Violation of classical regression model assumptions and consideration of modified estimation procedures that retain desirable properties; multiequation models. Computer applications and interpretation of empirical results.

**Econ 5261f-5262w-5263s. Introduction to Econometrics.** (5 cr per qtr; prereq 3101 or equiv, Math 1251-1252, Math 1261 or equiv, Stat 5121-5122 or Stat 5131-5132-5133 or #) Review of basic linear regression model and its variants; panel data, censored and truncated regression, discrete choice models, time series and simultaneous equation models.

**Econ 8201f-8202w-8203s. Econometric Analysis.** (4 cr per qtr; prereq 3101 or equiv, Math 1251-1252, Math 1261 or equiv, Stat 5121-5122 or Stat 5131-5132-5133 or #) Basic linear regression model and its variants; panel data, censored and truncated regression, discrete choice models; time series and simultaneous equation models.

**Econ 8204f-8205w-8206s. Applied Econometrics.** (3 cr per qtr; prereq 8101, 8104, Math 3252 or equiv, Math 5242 or equiv, Stat 5131 or #) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods.

**Econ 8211-8212-8213. Econometrics.** (3 cr per qtr; prereq 5151, 5152, Math 5243 or equiv, Stat 5133 or Stat 5123 or #) 8211: Linear regression. General linear hypotheses. Gauss Markov Theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. 8212: Simultaneous equations models; identification and estimation. Asymptotic distribution theory. 8213: Asymptotic distribution theory for nonlinear models. Applications, including multivariate time series models and/or limited dependent variables models.

**Econ 8281-8282. Advanced Topics in Econometrics.** (3 cr per qtr; offered when feasible)
ECONOMICS

Development

Econ 5301. Economic Development. (4 cr, §5331; not open to economics majors; prereq 1101, 1102 or equiv)

Econ 5307. Comparative Economic Systems. (4 cr; not open to econ majors; prereq 1101, 1102 or equiv)
Functions of economic systems; market economy vs. centrally planned economy. Post-socialist transitions in Eastern Europe and reforms in China. Initial conditions and strategy for reforms; results of reforms in terms of key economic indicators.

Econ 5311. Economy of Latin America. (4 cr, §5341; not open to econ majors; prereq 1101, 1102 or equiv)
Economic evolution in Latin America since 1950. Trade liberalization, poverty, inflation, and development strategies in selected countries. Theory and applications of important issues.

Econ 5312. Technology and Development. (4 cr; prereq 3101, 3102 or equiv or #)
Economics of research development; technical change and productivity growth; impact of technology on institutions; science and technology policy.

Econ 5313. The Russian Economy. (4 cr; prereq 3101, 3102 or equiv)

Econ 5315. The Japanese Economy. (4 cr, §3315; prereq 3101 or equiv; offered when feasible)

Econ 5331. Economic Development. (4 cr, §5301; prereq 3101, 3102 or equiv)

Econ 5337. Comparative Economic Systems. (4 cr, §5307; prereq 3101, 3102 or equiv)
Functions of economic systems; market economy vs. centrally planned economy. Post-socialist transitions in Eastern Europe and reforms in China. Initial conditions and strategy for reforms; results of reforms in terms of key economic indicators.

Econ 5341. Economy of Latin America. (4 cr, §5311; prereq 3101, 3102 or #)
Economic evolution in Latin America since 1950. Trade liberalization, poverty, inflation, and development strategies in selected countries. Theory and applications of important issues.

Econ 8311. Economic Growth and Development Theory. (3 cr; prereq 8103, 8105)
Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries.

Econ 8312. Technology and Development. (3 cr; prereq 8103, 8105; offered when feasible)

International Economics

Econ 5401. International Economics. (4 cr, §§5429, §5431, §5432; not open to econ majors; prereq 1101, 1102 or equiv)
Explanation of trade patterns. Commercial policy, protection, factor mobility. Balance of payments, exchange rate determination, international monetary system.

Econ 5421. Economic Integration in the Americas. (4 cr; prereq 3101, 3102, 3103 or equiv or #)
Kehoe Analysis of economic relationships among countries in Western Hemisphere. Modeling impact of the North American Free Trade Agreement and similar regional trade accords. Prospects for further integration.

Econ 5431. International Trade. (4 cr, §§5401, §5429; prereq 3101, 3102, 3103 or equiv)

Econ 5431H. Honors Course: International Trade. (4 cr for grad students, §§5401; prereq 3101, 3102, 3103 or equiv, 1 qtr calculus; B avg recommended)
For description, see Econ 5431.

Econ 5432. International Finance. (4 cr, §§5401; prereq 3101, 3102, 3103 or equiv; 5431 or equiv recommended)
Balance of payments, foreign exchange market, exchange rate determination. International monetary system.

Econ 8401-8402-8403. International Trade and Payments Theory. (3 cr per qtr; prereq 8102, 8104)
8401: Impact of trade on factor rentals. Stolper-Samuelson, Rybczynski, and factor price equalization theorems. Heckscher-Ohlin theorem. Derivation of offer curves and general international equilibrium. Transfer problem. 8402: Tariffs, quotas, and other barriers to trade; gains from trade; trading blocs; increasing returns; growth. 8403: International business cycles; exchange rates; capital movements; international liquidity.

Econ 8483. Advanced Topics in International Trade Theory. (3 cr; prereq 8101, 8102, 8403 or equiv or #; offered when feasible)

Econ 8491-8492. Workshop in Trade and Development. (Cr ar)
Written and oral presentations by Ph.D. students engaged in or planning to engage in thesis research in trade and development.
Labor

Econ 5531. Labor Economics. (4 cr, §3501; prereq 3101, 3102 or equiv)
Role of labor in economy: labor as a factor of production; population and the labor force; economics of labor markets; labor market institutions; theories of wages and employment; unions and collective bargaining; public policy.

Econ 8501-8502. Wages and Employment. (3 cr per qtr; prereq 8101, 8104)
Economic analysis of labor markets and their operation under conditions of both individual and collective bargaining. Implications of labor market operations for resource allocation, wage and price stability, income and employment growth. Wage structures and wage levels. Wage and employment theories and practices. Economic impacts of unions.

Econ 8583. Advanced Topics in Labor Economics. (3 cr; offered when feasible)

Industrial Organization

Econ 5611. Resource and Environmental Economics. (4 cr; prereq 3101 or equiv, 1 qtr calculus)

Econ 5611H. Honors Course: Resource and Environmental Economics. (5 cr; prereq 3101 or equiv, 1 qtr calculus) Exhaustible resources and theory of optimal depletion. Renewable resources and theory of optimal use. Does resource scarcity limit growth? Natural resources and natural environments. Environmental pollution and economic efficiency.

Econ 5621. Urban Economics. (4 cr; prereq 3101 or equiv)
Location of economic activity and of cities; central place theory; site rents and form of city; urban economic base and economic policy; urban problems and economic policies: transportation, poverty and segregation, housing, public finance.

Econ 5623. Housing Markets and Public Policy. (4 cr; prereq 1101, 1102 or equiv)

Econ 5631. Industrial Organization and Antitrust Policy. (4 cr, §3601; prereq 3103, 3103 or equiv)

Econ 5631H. Honors Course: Industrial Organization and Antitrust Policy. (4 cr for grad students; prereq 3101, 3103 or equiv, 1 qtr calculus; B avg recommended) For description, see 5631.

Econ 8601-8602-8603. Industrial Organization and Government Regulation. (3 cr per qtr; prereq 8101)
Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation.

Econ 8683. Advanced Topics in Industrial Organization. (3 cr; offered when feasible)

Money and Financial Economics

Econ 5701. Money, Banking, and Monetary Policy. (4 cr, §3701, §5761; not open to econ majors; prereq 1001, 1002 or equiv or #) Economic role of financial institutions, with emphasis on commercial banks, money supply, and monetary policy.

Econ 5721. Money and Banking. (4 cr, §5701; prereq 3101, 3102 or equiv; offered when feasible)

Econ 5721H. Honors Course: Money and Banking. (4 cr for grad students; prereq 3101, 3102 or equiv, 1 qtr calculus; B average recommended) For description, see 5721.

Econ 5731. Macroeconomic Policy. (4 cr; prereq 3101, 3102 or equiv) Monetary vs. fiscal policy debate in context of underlying macroeconomic theory controversy. Comparison of Keynesian, Monetarist, and Classical theories; rational expectations; policy ineffectiveness; time inconsistency; rules vs. discretion; budget deficits; unemployment and inflation.

Econ 5731H. Honors Course: Macroeconomic Policy. (4 cr for grad students; prereq 3101, 3102 or equiv, 1 qtr calculus; B average recommended) For description, see 5731.

Econ 5733. Intertemporal Economics and Money. (4 cr; prereq 3101, 3103 or equiv, Math 1251-1252, Math 1261 or equiv) Real intertemporal economics: overlapping-generations models of interest rates; applications of social security and deficit finance. Representative agent model, Ricardian Equivalence, introduction to neo-classical growth model.

Econ 5741. Business Cycles. (4 cr; prereq 3101, 3102, Stat 3011 or equiv) Models of economic growth are developed and matched to U.S. data; review of business cycle facts; growth model is used to examine impact of changes in important growth factors, including public finance and technology and for business fluctuations.

Econ 5741H. Honors Course: Business Cycles. (4 cr for grad students; prereq 3101, 3102, Stat 3011 or equiv, 1 qtr calculus; B avg recommended) For description, see 5741.

Econ 5752H. Honors Course: Financial Economics II. (4 cr for grad students, §3752; prereq 3751; B avg recommended) Efficiency of financial markets. Theoretical concepts and empirical evidence.
Econ 8701-8702-8703. Monetary Economics. (3 cr per qtr; prereq 8102, 8105)
Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy.

Econ 8704-8705-8706. Financial Economics. (3 cr per qtr; prereq 8102, 8105)
Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures.

Econ 8781-8782. Advanced Topics in Monetary Economics. (3 cr per qtr; offered when feasible)

Econ 8793. Workshop in Macroeconomics. (Cr ar)
Written and oral presentations by Ph.D. students engaged in or planning to engage in thesis research in macroeconomics.

Public Finance
Econ 5821. Introduction to Public Economics. (4 cr, §3801; prereq 3101, 3103 or equiv)
Tax and expenditure policies, primarily at federal level. Impact of tax structure on distribution of income. Evaluation of public programs. Optimal mix of public and private sector output.

Econ 5831. Cost-Benefit Analysis. (4 cr; prereq 3101, 3103 or equiv)
Principles for evaluation of benefits and costs of public projects or programs. Issues connected with definition and measurement of benefits and costs. Rate of return and rate of discount. Market imperfections, risk, and uncertainty.

Econ 5831H. Honors Course: Cost-Benefit Analysis. (4 cr for grad students; prereq 3101, 3103 or equiv, 1 qtr calculus; B avg recommended)
For description, see 5831.

Econ 8801-8802-8803. Public Economics. (3 cr per qtr; prereq 8102, 8105)

Econ 8882-8883. Advanced Topics in Public Finance. (3 cr per qtr; offered when feasible)

Education

Degrees Offered—M.A., Ph.D., and Certificate of Specialist in Education.

Curriculum—The broad goal of graduate programs with a major in education is to develop, validate, and disseminate knowledge on educational theory and practice to improve the quality of education at all levels. The master’s degree is offered with emphases in curriculum and instruction and in work, community, and family education. The doctoral degree is offered with emphases in curriculum and instruction (see Curriculum and Instruction for description); recreation, park, and leisure studies (see Kinesiology and Leisure Studies for description); and work, community, and family education (see Work, Community, and Family Education for description). The specialist certificate is offered with emphases in general curriculum supervision and mathematics education.

Please note that the Ph.D. thesis credit course entry for education is divided as follows into sections corresponding to the various emphases:

Educ 8666. Doctoral Pre-Thesis Credits. (max 18 cr per qtr; doctoral student who has not passed oral prelims)

Educ 8888. Thesis Credits: Doctoral. (36 cr required for Ph.D.)

Section 1. Curriculum and Instruction
Section 2. Work, Community, and Family Education
Section 3. Recreation, Park, and Leisure Studies

Note—For other education-related degrees, see also Child Psychology; Curriculum and Instruction; Educational Policy and Administration; Educational Psychology; Kinesiology and Leisure Studies; and Work, Community, and Family Education.

Educational Administration

See Educational Policy and Administration.

1 Advanced work leading to the professional degree of master of education (M.Ed.) is offered by the College of Education and Human Development in adult education; agricultural education; art education; business and marketing education; community education administration; curriculum and instructional systems; early childhood education; elementary education; family education; industrial education; mathematics education; music education; physical education; developmental/adapted physical education; recreation, park, and leisure studies; special education; work, community, and family education; and several secondary academic fields. Interested persons should consult the College of Education and Human Development Bulletin.
Educational Policy and Administration (EdPA)

Professor: Ayers Bagley, director of graduate studies; William M. Ammentorp\(^1\); Robert H. Brunink\(^2\); John J. Cogan\(^1\); George H. Cop\(^2\); Glenn L. Hendricks; Vernon L. Hendrix\(^1\); Stephen A. Hoemanck; Clifford P. Hooker\(^{emeritus}\); Dale L. Lange\(^2\); Darrell R. Lewis\(^3\); Karen Seashore Louis\(^2\); Marion Lundy-Dobbert; Tim L. Mazzoni\(^1\); Josef A. Mestenhauser\(^1\); Charles E. Moore\(^1\); Van D. Mueller\(^1\); Neal C. Nickerson\(^1\); James R. Rest; Charles H. Sederberg\(^1\); Robert D. Tennyson; Joyce Ann Walker\(^2\); Richard F. Weatherman\(^2\); W. Keith Wharton\(^1\); Kathleen M. Zurcher

Associate Professor: Gary F. Alkire\(^1\); Melissa S. Anderson; Arthur M. Harkins; Jean A. King\(^2\); Elaine L. Leach\(^1\); Theodore Lewis\(^1\); John M. McLaughlin\(^1\); Robert E. Orton; R. Michael Paige\(^1\); Thomas D. Peacock\(^1\); Barbara Pilling\(^1\); Byron J. Schneider\(^1\); James R. Stone III\(^3\); Caroline S. Turner\(^1\)

Assistant Professor: Jennifer York-Barr\(^1\)

Senior Fellow: Richard B. Heydinger\(^1\); Dean Honetschlager\(^1\); Josie R. Johnson\(^1\)

Research Associate: Darwin D. Hendel

Lecturer: Neil E. Christenson\(^1\); Timothy J. Delmont\(^1\); David R. Johnson\(^1\); Clark M. Kirkpatrick\(^1\); Gerald G. Mansergh\(^2\); Judee G. McMullen\(^1\); Bruce H. Miles\(^1\); Thomas F. Morgan\(^1\); Joseph H. Nathan\(^1\); Benjamin Ramirecz-Shkwegnaabi\(^1\); Terry H. Schultz\(^1\); Barbara J. S. Shin\(^1\); Kyla L. Wahlstrom\(^1\)

Adjunct Lecturer: Michael J. Lovett\(^1\)

Other: Carol M. Boyer\(^1\); Gerald A. McIntosh\(^1\); David Murphy

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—M.A. (Plan A and Plan B) in educational policy and administration; Ed.D. in educational administration; Ph.D. in educational policy and administration; Certificate of Specialist in Education in educational administration (admissions to the Certificate of Specialist program are on hold for 1996-99). The master’s degree ordinarily serves as a first step for students beginning graduate study in the field. The Ph.D. program emphasizes intensive and individualized study in one of the concentrations described above, and is especially appropriate for those who plan to pursue research, teaching, or leadership careers in the field of educational policy and administration. The Ed.D. program is particularly suitable for individuals interested in leadership careers in the operation of K-12 or two-year postsecondary institutions.

Free-standing minors are available in international education and in social and philosophic studies of education. See separate sections for each.

Prerequisites for Admission—Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications for doctoral studies are encouraged from individuals who may have completed master’s programs in areas such as curriculum studies, public affairs, sociology, psychology, economics, political science, international relations, management science, measurement and statistics, and educational psychology. Opportunities are designed for mature/employed students as well as for those who wish to pursue graduate studies full time.

Special Application Requirements—Scores from the Graduate Record Examination (GRE), General Test only, are required from all applicants. Applicants must also submit a department application that includes a statement on background, interests, and goals, and two personal references.

Master’s Degree Requirements—There is considerable flexibility in designing programs to meet individual circumstances, depending on the student’s emphasis and career interests. A typical program includes 21 to 24 credits in the...
area of emphasis, 8 to 10 credits in a related field, 6 to 9 credits in related methodology preparation, and 9 to 12 credits in electives or an optional internship. The final requirements for the Plan B program, which is recommended for most students, are an oral examination and a research paper. More specific information and sample course plans for each separate degree program are available from the department.

**Doctor of Education Degree Requirements**—The doctorate of education consists of a major of at least 21 credits in the core curriculum, 12 credits in a research methodology sequence, 0 to 9 credits in an internship or clinical experience (depending on the previous professional experience of the applicant), and 12 to 21 credits in specializations (e.g., seminars, leadership courses, technical courses). Twenty-four credits are taken in supporting areas; typically at least 15 of these are taken from outside the College of Education and Human Development in areas that are appropriate for the study of administration. The preliminary written and oral examination requirements vary depending on the Ed.D. program. The final project is a research project that should contribute to the improvement of practice. Several specialized cohort programs are available or are under development; Ed.D. degrees are offered in leadership in two-year institutions, metropolitan school administration, and international education leadership.

**Doctor of Philosophy Degree Requirements**—Students must take 18 credits in the department core curriculum. The various emphases also have common core requirements that range from 15 to 18 credits. A minimum of 18 credits is required in a research sequence that includes quantitative and qualitative methods. At least 18 credits are required in a minor or supporting program. All Ph.D. students take a preliminary written examination that covers the department core courses and the student’s area of emphasis, and an oral examination. The final dissertation is a research project that should contribute to the theory of educational policy or administration.

**Language Requirements**—None.

**For Further Information and Applications**—Contact the Department of Educational Policy and Administration, University of Minnesota, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612/624-1006; fax 612/624-3377).
EdPA 5120. History of Childhood Education. (3 cr, §3120, §SPFE 5120) Bagley
Childhood education in Western civilization; emphasis on images, symbols, ideas important to educational theory and practice in home and school.

EdPA 5125. Youth in Modern Society. (4 cr, §Soc 5952) Schneider
Youth in advanced societies and as a social entity; functions and roles in industrial society, family, education, politics and government, economy and work, welfare and religion; organizations, social movements, and subcultures; empirical research and cross-cultural perspectives.

EdPA 5128. Workshop: Educational Administration. (1-6 cr)
Lab approach provides opportunities for experienced administrators to concentrate on common administrative and supervisory problems.

EdPA 5130. Leadership Development Seminar. (3 cr; prereq advanced application, College of EHD approval) Nickerson
Assessment and development of skills required of the educator in areas of planning, decision making, and human relations; introduction to contemporary issues in educational administration.

EdPA 5131. Comparative Education. (4 cr) Cogan
European, Asian, and American systems and philosophies of education; possibilities of international education.

EdPA 5139. Laboratory in Decision Making. (3 cr; prereq advanced application) Nickerson
Contribution of recent research and theory to effective administration; analysis of administrative behavior in realistic settings and relations of administration to human behavior.

EdPA 5141. Critical Issues in Contemporary Education. (3 cr) King, York-Barr
Introduces graduate students to ideas involved in current theory and practice.

EdPA 5142. Racial and Ethnic Diversity in Higher Education. (3 cr; A-F only) Turner
Review of research. Theoretical frameworks, methodological perspectives, and research strategies used to study students, staff, and faculty; historical perspectives.

EdPA 5155. History of Western Educational Thought. (4 cr, §3155, §Hum 3155/5155) Bagley
Major educational classics of Western civilization: Plato, Aristotle, Cicero, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.

EdPA 5156. History of Ideas in American Education. (3 cr) Bagley
Readings in American political, economic, and social development related to education; reference to the emerging system of public education. Recommended as background for EdPA 5170, but not a prerequisite.

EdPA 5167. The American Middle School. (3 cr) Nickerson
Sources of the movement; purposes, functions, and limitations; fundamental problems, types, and curricular implications of reorganization.

EdPA 5169. Ethnic Groups and Communities: Perspectives on Families, Children, and Youth. (3 cr) Lundy-Dobbert
Roles of young people in widely varied North American communities. Comparative aspects of youth commitment to society, economic value of youth, youth-adult conflict, and youth roles in the family. Well-defined analyses of contextual roles. Complexity of policy for appropriate educational and community development.

EdPA 5170. American Pragmatism and Education. (3 cr)
Analysis and interpretation of the educational philosophy of pragmatism (experimentalism); readings from Dewey, Kilpatrick, Bode, Counts, Childs, and others.

EdPA 5171. Anthropology and Education. (4 cr, §Anth 5145) Lundy-Dobbert
Cross-cultural perspectives in examining educational patterns, the implicit and explicit cultural assumptions underlying them; methods and approaches to cross-cultural studies in education.

EdPA 5173. Case Studies for Policy Research. (3 cr; prereq educ or grad student or #; A-F only) Turner
Using qualitative case study research method and applying it to educational practice. Emphasis on designing studies that employ open-ended interviewing as primary data collection technique. Class project.

EdPA 5174. Ethnographic Research Methods. (4 cr; prereq 5171 or Anth 5144 or Anth 5145) Lundy-Dobbert
Practice in aspects of field methodology below the level of full field study; detailed reading; analysis of studies in anthropology and education for methodological content.

EdPA 5176. Ethnographic Research Skills Laboratory. (2 cr; prereq §1574; S-N only) Lundy-Dobbert
Introduction to processes of creating evaluative design; supervised practice in data analysis, use of theory, proposal writing, reporting.

EdPA 5178. Project in Teacher Leadership. (1-9 cr, §Cl 5178; prereq grad student or #)
Create and present project for instigating or promoting change within education.

EdPA 5180, 5181. Seminar: Administration of Special Education. (3 cr per qtr, §EPsy 8760, 8761; prereq 5103 or EPsy 5660 or #) Weatherman
Problems of administration and organization of special education programs.

EdPA 5182. Comparative Philosophies of Education. (3 cr) Orton
Examination of competing philosophies of education.

EdPA 5190. Sociology of Education. (4 cr, §Soc 5953) Louis
Advanced studies in social aspects of education including schooling as a socialization process, the social structure of education, the role of school in social change.

EdPA 5201. Formal Organizations in Education. (3 cr) Anderson, Louis, Turner
Introduction to classical and current theories of organizational behavior and administration in education. Leadership and control, communication, conflict, effects of educational environments, organizational design and change, and organizational effectiveness.
EdPA 5202. Politics of Education. (3 cr) Mazzoni
Social science findings, concepts, and methods used to
consider political context of educational administration; emphasis on creation of public school policy by local
and state governments; role of administrators.

EdPA 5204. Financing Elementary and
Secondary Schools. (3 cr) Mueller, Sederberg
Value assumptions and educational finance policy,
economic factors, sources and characteristics of
educational revenue, state and local distribution systems,
federal support, urban/rural variations, institutional
financing alternatives.

EdPA 5209. Education in Future Social
Systems. (3 cr) Harkins
Interdisciplinary inquiry into problems of social
specialization and generalization; projections and
analysis of long-range (30 years or more) social and
technological trends related to education.

EdPA 5210. Social Forecasting and
Educational Futures. (3 cr) Harkins
Application of social sciences in their academic and
applied dimensions to formal education, including
social-scientific and systems orientation toward
communities; emphasis on short-range social and
educational planning, near-present to a few years hence.

EdPA 5211. Social Design and Educational
Futures. (3 cr) Harkins
Medium-range interdisciplinary approach to community
design and analysis emphasizing formal education systems
in community context; focus upon new neighborhoods,
towns, experimental cities, and subcultural enclaves in rural
and urban settings emphasizing time periods from several
years to three decades hence.

EdPA 5212. School Budgeting. (3 cr) Sederberg
Concepts and skills involved in preparing financial
budgets for public schools; competency in translating
educational programs into budgetary systems,
anticipating revenue receipts, planning expenditures, and
techniques for preparing a balanced budget.

EdPA 5214. School Management Information
Systems. (3 cr) Hendrix, Sederberg
Basic techniques required to generate, maintain, and
make accessible computer-based management
information system in education.

EdPA 5215. The Principalship. (3 cr) Alkire,
Nickerson
Role of the principal: qualifications, duties, and problems.

EdPA 5216. Recent Research in Elementary
School Administration. (3 cr; prereq 5215) Alkire
Pertinent research literature.

EdPA 5222I. Introduction to Policy Research.
(3 cr; A-F or S-N for grad students, A-F for others)
Anderson, Mazzoni, Mueller
Political, philosophical, environmental, and methodological
issues that accompany policy research in education;
applicability of quantitative and qualitative methods.

EdPA 5224. Legal Implications of Acts by
School Boards, Administrators, and
Teachers. (3 cr; A-F only) Hooker
Constitutional, statutory, and common law bases of
school administration; principles growing out of
fundamental legal procedures.

EdPA 5225. Educational Policy and the Law.
(3 cr; A-F only)
Analysis of court decisions, statutes, and administrative
regulations related to equality of educational opportunity
and equal protection under the law.

EdPA 5227. Public School Personnel
Programs. (3 cr) Alkire
Selection, assignment, evaluation, and development of
school personnel; salary and conditions of service;
policies of administrative, instructional, and
noninstructional personnel.

EdPA 5240. Seminar: Clinical Experiences in
Educational Administration. (1.9 cr, §8240; S-N only)
For educational administration majors engaged in
clinical experiences.

EdPA 5245. Ethics, Morality, and Values in
Education. (3 cr) Orton
Application to key issues of professional practice.

EdPA 5250. American Higher Education. (4 cr)
Anderson, Lewis
American higher and postsecondary education in historical
and contemporary perspective; special emphasis on societal
and political demands on higher education system;
consequent changes in various forms and functions.

EdPA 5260. Introduction to Educational
Planning. (3 cr)
Principles, tools, and emerging issues in higher and
elementary/secondary education settings, including
decision-making models, strategic planning, forecasting,
program planning, and short-range planning.

EdPA 5265. Administering the High School
Program. (3 cr) Nickerson
Principal as instructional leader; practices and
procedures used in building master schedule; analysis
and evaluation of school program and services.

EdPA 5267. Small Group Dynamics and Shared
Decision Making. (3 cr, §EPsy 5155; EPsy 5150
recommended)
Theory and research in group dynamics; application to
practical situations. Setting clear and operational group
goals, communicating, leadership, power and influence,
group decision making, controversy and group problem
solving, and conflict resolution.

EdPA 5272. Problems: Educational Policy
and Administration. (1-3 cr per qtr, §8272)
For students in educational policy and administration who
are qualified to carry out intensive studies of a school system.

EdPA 5274. Two-Year Postsecondary
Institutions. (3 cr, §VoEd/WCFE 5274) Turner
Present status, development, functions, organization,
curriculum, and trends in postsecondary but
nonbaccalaureate institutions.
EdPA 5280. Introduction to the Economics of Education. (4 cr) Lewis
Economic impact of education on educational markets, prices and production relationships, distribution of income, and investment and cost-benefit analysis in education.

EdPA 5281. Cost and Economic Analysis in Educational Evaluation. (3 cr; S-N only) Lewis
Use and application of cost-effectiveness, cost-benefit, cost-utility, and cost-feasibility in evaluating educational problems and programs.

EdPA 5285. Principles and Methods of Evaluation. (3 cr, §EPsy 5240) King
Introduction to program evaluation; theory; practical examples; purposes, role, program descriptions, and evaluation strategies.

EdPA 5292. The Law and Postsecondary Educational Institutions. (3 cr; A-F only)
Analysis of court opinions and Federal regulations affecting postsecondary educational institutions.

EdPA 5420. Leadership and Administration of Student Affairs. (3 cr, §EPsy 5420)
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

EdPA 5540. Seminar: The College Student. (3 cr, §EPsy 5451; prereq 6 cr psychology or educational psychology) Hendel
Psychology and sociology of college students; research on diversity of populations, vocational development, student society, culture, mental health, underachievement, dropouts, values and attitudes; relevant research methods.

EdPA 5601. International Education: Topics in Classroom Practices and Procedures. (1-12 cr [max 12 cr], §AdEd 5601; prereq tchg licensure, #; A-F only) Cogan, Mestenhauser, Paige
Educational practices in a designated country, region, or cultural group; impact of social and cultural features; organization, school structures, classroom practices, and delivery of educational services; potential for implementation in the United States.

EdPA 5603. International Education and Development. (4 cr, §AdEd 5603; A-F only) Cogan, Mestenhauser, Paige
Contemporary theories relating formal and nonformal education to national development in social, cultural, political, and economic sectors; alternative conceptualizations and theoretical perspectives on education and development.

EdPA 5605. Research Topics: International Development Education. (4 cr, §AdEd 5605; A-F only) Cogan, Mestenhauser, Paige
Empirical research conducted in developing societies relating formal and nonformal education to national development in social, cultural, political, and economic sectors.

EdPA 5607. Applied International Development Education. (4 cr, §AdEd 5607; A-F only)
Educational innovations designed to promote national development in selected developing nations; educational case studies in the context of such objectives; conceptualizations of the role of education in development and outcomes.

EdPA 5609. Critical Issues in International Education and Educational Exchanges. (4 cr; prereq #) Mestenhauser
Comprehensive, multidimensional approach to policy and practices of U.S. and other universities in international education and its components. Conceptual development; interdisciplinarity; integration of learning and production; application to programs, global careers, and curriculum.

EdPA 5701. Theories of International Development. (4 cr; prereq international relations major or #)
Interdisciplinary approaches to understanding contemporary development theory and practice. Selected theoretical framework and case studies illustrating complexities of development planning and implementation.

EdPA 5716. Collaboration for Inclusive School Communities. (3 cr, §EPsy 5607; A-F only) York-Barr
Implications of and rationale and strategies for including students with unique needs (e.g., disabilities) in general education classroom settings. Importance of creating a sense of community among students and adults in today’s heterogeneous classrooms and schools.

EdPA 5931. Minnesota Studies in International Development (MSID) Seminar. (4 cr; prereq international relations major or #)
Intercultural living and learning, and undertaking research activities in developing nations, in preparation for internships in overseas development agencies.

EdPA 8170. Seminar: Research Methods in Anthropology and Education. (3 cr; prereq international relations major or #) Lundy-Dobbert
Anthropological research below dissertation level including designing and carrying out a research project related to education, schools, or socialization; emphasizes relevant theory, reliability and validity, research ethics, and reporting.

EdPA 8172. Classic Readings in Anthropology and Education. (3 cr; prereq 5171 or anth grad student)
History and philosophy; current impact of different schools of thought from 1898 to present.

EdPA 8175. General Systems Thinking for Analyzing Education. (4 cr, §5175) Lundy-Dobbert
Historical and contemporary systems philosophy, thinking, and analysis. Developing concepts and skills for coping with evolutionary and chaotic environments. Modeling and simulating learning systems in rapidly changing national and international contexts.

EdPA 8220. Quantitative Foundations for Management Methods. (3 cr)
Quantitative techniques for research and analysis of policy, program, and management problems, and decision situations in administration of educational organizations; includes computer usage.

EdPA 8225. Evaluation Theory and Models: Qualitative and Quantitative Alternatives. (3 cr; prereq 5285 or EPsy 5240 or equiv or #) King
Models and theoretical frameworks developed by program evaluation professionals since 1960s.
EDUCATIONAL PSYCHOLOGY

EdPA 8228. Problems: Higher Education. (Cr ar; prereq #)
Selected topics on college programs, instruction, organization, and administration.

EdPA 8229I. Seminar: Higher Education. (1-4 cr; prereq #)
Intensive study of selected topics.

EdPA 8230. Seminar: Dissertation Research in Higher Education. (1 cr per quarter; S-N only)
Anderson, Lewis, Louis, Turner
Two-quarter seminar for candidates designing or conducting studies. Selecting a problem; designing an appropriate study; collecting, analyzing, and summarizing data and preparing a written account; critical review of candidates’ individual projects.

EdPA 8238. Seminar: Theory and Research. (3 cr; prereq educational administration or educational policy major or #) Ammentorp, Hendrix, Mazzoni, Mueller
Research design involving thesis or field project; interrelatedness of conceptual framework formulation and the analytical process; clinical and research problems.

EdPA 8241. Seminar: Internship in Educational Administration. (0-9 cr; S-N only) Sederberg
For interns in elementary, secondary, general, and postsecondary administration.

EdPA 8248. Seminar: Metropolitan School Governance. (3 cr; prereq 5202)
Impact of metropolitanization on policy issues confronting public schools in core cities; strategies proposed for restructuring educational governance emphasizing Twin Cities metropolitan area.

EdPA 8250. The Higher Education Institution: Organization and Environment. (3 cr; prereq 5201, 5250) Turner
Colleges and universities as complex organizations. Emphasis on effects of social, economic, political, and demographic environment on structures and processes; reciprocal effects of colleges and universities on their environments.

EdPA 8252. Instruction and Learning in Higher Education. (3 cr; prereq 5250)
Teaching-learning relationship; study and appraisal of methods employed to encourage, guide, and appraise students’ learning.

EdPA 8255. Leadership and Administration in Higher Education. (3 cr; prereq 5201, 5250) Anderson
Higher education governance, administration, and leadership from theoretical and applied perspectives; decision-making structures and processes, and planning.

EdPA 8257. Financing Higher Education. (3 cr) Ammentorp
Financing postsecondary systems at national and state levels; financing postsecondary students; budgeting and financial analysis in postsecondary institutions; cost-effectiveness analysis.

EdPA 8258. Federal and State Higher Education Policy. (3 cr; prereq 5250) Anderson
Issues in developing and implementing federal and state higher education policy; finance and financial aid.

EdPA 8261. Problems: Social and Philosophical Foundations of Education. (Cr ar, §SPFE 8241; prereq #)
For graduate students interested in research and original work in these areas.

EdPA 8268. Seminar: Social and Educational Futures. (1-6 cr [max 6 cr]; prereq 5209 or 5210 or 5211 or #) Harkins
Review and critique of outstanding theoretical contributions of leading social and educational futurists to delineate areas for additional inquiry and research.

EdPA 8270. Problems: Elementary School Administration. (Cr ar; prereq #)

EdPA 8271. Problems: Secondary School Administration. (Cr ar; prereq #)

EdPA 8273. Field Study. (0-10 cr; prereq #)
Required for specialist in education certificate. The 10 credits are based on a written report covering an approved field study. Students may register for the general planning and organization of their study without credit.

EdPA 8340. Simulation in Educational Design. (3 cr, §EdAd 8340; prereq 8220; S-N only) Ammentorp
Policy systems as feedback control structures; reduction of policy problems to causal structures translated into mathematical models; general principles of system structure and response used to interpret behavior of typical policy systems in education.

EdPA 8341. Simulation Analysis of Educational Policy Systems. (3 cr, §EdAd 8341; prereq 8340; S-N only) Ammentorp
Techniques of computer simulation applied to study of policy impact and management structures in education; simulation analysis of specific education policies and techniques applicable to problems of personal interest.

EdPA 8603. Seminar: International Development Education. (3 cr; prereq 5603) Cogan, Mestenhauser, Paige
Key theoretical issues; formal and nonformal education.

EdPA 8605. Problems: International Education Research. (3-6 cr; prereq 5605) Cogan, Mestenhauser, Paige
Examination of comparative research studies, emphasizing development education.

Educational Psychology (EPsy)

Professor: Susan C. Hupp, chair; William M. Bart; Jerome Beker; Robert H. Bruininks; Mark L. Davison; Stanley L. Deno; Byron Egeland; David L. Giese; L. Sunny Hansen; Vernon L. Hendrix; Thomas J. Hummel; David W. Johnson; Paul E. Johnson; Roger T. Johnson; Frances P. Lawrenz; Rodney G. Loper; Geoffrey R. Maruyama; Patricia R. McCarthy Veach; Scott R. McConnell; Jack C. Merwin (emeritus); Joe E. Rechlic; James R. Rest; John E. Rynders; S. Jay Samuels; Stuart J. Schleien; Thomas M. Skovholt; Robert D. Tennyson; James S. Terwilliger; James E. Turnure; Paul W. van den Broek; Richard F. Weatherman; Richard A. Weinberg;
Wayne W. Welch (emeritus); Frank B. Wilderson, Jr.; Frank Henderson Wood (emeritus); James E. Ysseldyke
Associate Professor: Marie Knowlton, director of graduate studies; Sandra L. Christenson; Ernest C. Davenport; Lynne K. Edwards; V. Lois Erickson; Christine A. Espin; Joan B. Garfield; Jean A. King; Donald G. MacEachern; Mary A. McEvoy; John L. Romano; Susan Rose; John M. Taborn
Assistant Professor: Annie Baldwin; Carol A. Davis; Lynn Friedman; Darcia F. Narvaez; Jennifer York-Barr
Lecturer: Brian H. Aberly; Ann M. Casey; David R. Johnson; Douglas B. Marston; Ronald P. Matross; Kevin S. McGrew; Robert J. Murphy; Steven L. Robinson; Richard J. Spicuzza; Joyce D. Weinsheimer
Other: Sue A. Kroeger; Kevin J. Nutter; Kay A. Thomas

Please read the General Information section of this bulletin for Graduate School requirements that apply to all major fields.

Degrees Offered—M.A. (Plan A and Plan B), Ph.D., and Certificate of Specialist in Education.

Curriculum—Program areas are counseling and student personnel psychology (CSPP); school psychology; special education; and psychological foundations of education (including evaluation, computer applications, statistics, and research design, as well as learning, cognition, human relations, measurement, social psychology, and educational technology).

Prerequisites for Admission—There are no special prerequisites for admission at the M.A. level in any of the four program areas, or at the Ph.D. level in school psychology or psychological foundations of education.

Applicants to the CSPP doctoral program should hold either a bachelor’s or master’s degree with a major in psychology, education, counseling, or a related field. CSPP applicants interested in earning the specialist certificate should hold an M.A. degree; if not, they should apply to both the M.A. and specialist certificate programs.

Special Application Requirements—Applicants must submit a department application (with clear indication of the desired program area), a statement of goals and interests, three letters of recommendation, and a Graduate School application accompanied by official transcripts from all colleges and universities attended. These test scores are required: the CSPP, psychological foundations of education, and special education programs require the Graduate Record Examination (GRE); the school psychology program requires the GRE and later an interview for those who make the initial cut.

Applications to CSPP, school psychology, and special education are accepted for fall admission only; the deadline is January 15. Applications to psychological foundations are accepted throughout the year.

Master’s Degree Requirements—Programs must include a minimum of four core courses (one in each of the following content areas): statistics, measurement or evaluation, human learning or cognition, and personality or social psychology. The final examination in CSPP is a written comprehensive exam. The other final examinations are oral.

Doctoral Degree Requirements—Programs must include a minimum of twelve core courses: three in statistics; two in human learning or cognition; at least one in each of the following areas—measurement, evaluation, personality, social psychology, and critical issues in educational psychology; plus two more. Students should check with their specific program area concerning additional course requirements, written general preliminary examination requirements, and thesis procedures.

Specialist Certificate Requirements—Programs must include a minimum of six core courses, one in each of the following areas—statistics, measurement or evaluation, human learning or cognition, personality or social psychology—plus two more. The final examination is oral. For general requirements, see Specialist in Education in the General Information section of this bulletin. These specialist certificate programs are available:

Counseling—This program provides advanced training in one or more specialized areas related to the field of counseling. Applicants should have a broad background in the social and behavioral sciences. The program allows for in-depth study related to the work of the counselor. It is expected that the student will have completed coursework or can demonstrate competency in specified areas, with specialization in one or two.

School Psychology—Across two years, the student completes requirements for the M.A. degree, including coursework in educational psychology, psychology, child psychology, diagnostic and remedial procedures, and special education. Specialist certificate students complete an internship during the third year, doctoral students during the fifth year.
Special Education—This program is for students preparing for administrative, supervisory, and consultative positions in special education. Flexibility allows concentration in a particular field (e.g., education of persons who are learning disabled, mentally disabled, or deaf/hard of hearing). Generally students are expected to develop competencies in several areas of special education. Applicants should have basic preparation and experience in at least one special education area as well as licensure for public school work.

Minor Requirements for Students Majoring in Other Fields—A minor in educational psychology for doctoral students consists of 21 quarter credits, 12 of which must be at the 8xxx level. The minor must include either (a) 21 credits in psychological foundations or (b) 12 credits in psychological foundations plus 9 credits in the applied areas CSPP, school psychology, special education, 6 of which must be the same area. A minor in educational psychology for master’s students consists of 9 quarter credits.

Language Requirements—None.

For Further Information and Applications—For general assistance and information, contact the Director of Graduate Studies Assistant, Department of Educational Psychology, University of Minnesota, 202 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/624-6083; fax 612/624-0879; e-mail kwalter@tc.umn.edu). For specific program materials, contact the program areas as follows: Counseling and Student Personnel Psychology (CSPP), University of Minnesota, 129 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/624-1698; fax 612/624-8241; e-mail warho004@tc.umn.edu). For other program areas, contact the program area as follows:

- EPsy 8777. Thesis Credits: Master’s. (16 cr required; Plan A only)
- EPsy 8888. Thesis Credits: Doctoral. (36 cr required)
- EPsy 5110. Intelligence. (3 cr) Bart
  Theories of intelligence, including contemporary theories; its development; implications for educational practices and psychological inquiry.
- EPsy 5112. Knowing, Learning, and Thinking. (4 cr) Samuels
  Principles of human information processing; issues in memory and thought; discussion of mental operations in comprehension and understanding; analysis of intellectual structures supporting problem solving in applied settings.
- EPsy 5113. Introduction to Instructional Psychology and Technology. (3 cr) R Tennyson
  Theory, research, and practice. Contemporary issues in advanced learning technologies, including instructional design, open/distance learning, virtual environments, instructional interfaces, feedback strategies for technology-based learning, multimedia/interactive media, adaptive learning, and courseware authoring.
- EPsy 5114. Psychology of Student Learning. (3 cr) Samuels, van den Broek
  Survey of psychological methods and principles; models of the learner; topics in development, creativity, intelligence, and motivation; implications for teaching and curriculum design in preschool, elementary, and secondary education; professional training with children and adolescents as clients.
  Survey of psychological methods and principles in human learning; models of adult learner, topics in motivation, creativity, achievement, intelligence; implications for teaching and curriculum design in higher education, continuing education, and professional training.
- EPsy 5116. Behavior Analysis in Education. (4 cr) Davis, Deno, McEvoy
  Practical applications of reinforcement theory; behavior analysis, precision teaching, programmed instruction.
  Strategies, rules, methods, and other cognitive components involved in problem solving and decision making; implications for practices in education and other applied domains.
- EPsy 5119. Learning and Cognitive Foundations of Education. (4 cr; prereq College of EHD student or CLA music educ major or Δ; 1 psychology course recommended) Bart, Samuels Principles of development, learning, cognition, individual differences, classroom management, instructional delivery, and related topics, and their applicability to instruction and organization of curricular materials.
- EPsy 5125. Psychology of Building Character, Values, and Behavior. (3 cr) Samuels
  New approaches to motivating and creating desirable values and behavior. Strengths and weaknesses of traditional and new approaches.
EPsy 5130. Personality and Social Development. (3 cr; prereq 5 cr intro psychology)
Major concepts and research findings in adjustment and development, with special emphasis on educational implications.

EPsy 5135. Human Relations Workshop. (6 cr; meets human relations req for tchr licensure renewal; S-N only) Puncochar
Experientially based course addressing issues of prejudice and discrimination in terms of history, power, and social perception. Skills in cooperative learning, multicultural education, group dynamics, prejudice reduction, and conflict resolution.

EPsy 5139. Building a Learning Community. (4 cr, §3139; prereq College of EHD student or CLA music major or δ, at least 1 psychology course) Narvaez
Major theories of and research on schooling as it relates to human relations, small groups, face-to-face relations, and individual personality and social development.

Theory and research; major theorists; using knowledge in applied settings. Social perception, interdependence, interaction, and influence; conflict resolution.

Understanding cooperation, how it works, the teacher’s role, and research validating its use; using cooperative learning in instructional situations.

EPsy 5154. Organizational Development and Change. (3 cr, §8151; 5150 or equiv recommended; offered alt yrs) D Johnson
Theory and research. Organizational and social psychological theory and research applied to practical situations. Diagnosis and intervention skills.

EPsy 5155. Small Group Dynamics and Shared Decision Making. (3 cr, §EdPA 5267; 5150 or equiv recommended; offered alt yrs) D Johnson
Theory, research, and practical applications. Setting clear and operational group goals, communication, leadership, power and influence, group decision making, controversy and group problem solving, and conflict resolution.

EPsy 5200. Special Topics: Psychological Foundations. (1-6 cr)
Analysis of psychological and methodological concepts relevant to current educational practice.

EPsy 5217. Proseminar in Educational Psychology. (1-3 cr [max 3 cr])
Examination of types of research.

EPsy 5220. Educational Measurement in the Classroom. (4 cr) Terwilliger
Principles and methods for construction, evaluation, and improvement of classroom measures; techniques for describing results statistically; use of measurement in evaluating instruction and student performance; assignment of grades.

EPsy 5221. Basic Principles of Measurement. (3 cr; prereq 5260 or 8260 or PsyF 5110 or 8110) Davenport, Terwilliger
Fundamental concepts, principles, and methods in educational and psychological measurement; educationally useful properties of tests; types and uses of derived scores; factors influencing reliability and validity.

EPsy 5222. Modern Measurement Theory and Practice. (3 cr; prereq 5221, 8260, 8261 or equiv, offered alt yrs) Davison
Introduction to modern measurement practices, such as item banking and test scoring equipment; modern measurement theories of test items analysis, reliability, and validity.

EPsy 5229. Classroom Assessment Methods. (2 cr; concurrent practice tchg or similar field exper recommended)
Concepts and techniques for effective diagnosis of learning problems and assessment of educational outcomes. Emphasis on constructing teacher-made assessment devices that are efficient, technically sound, and directly relevant to classroom decision making.

Introductory course in program evaluation; theory; practical examples; purpose, roles, program descriptions, and evaluation strategies.

EPsy 5243. Practicum: Survey and Observational Research Methods. (3 cr; prereq 5220 or 5221 or equiv; offered alt yrs) Garfield
Planning, development, implementation, analysis, and reporting of survey and observational methods including questionnaires, interviews, and various observational techniques.

EPsy 5246. Evaluation Colloquium. (1 cr [max 6 cr]; S-N only; offered when feasible) King

EPsy 5260. Introductory Statistical Methods. (4 cr)
Techniques for organizing and presenting data; descriptive indices of central tendency, variability and bivariate correlation/regression; procedures for making inferences concerning means and proportions.

EPsy 5261. Applied Matrix and Vector Concepts. (1 cr; S-N only)
Introduction to concepts and operations; applications in multiple regression, factor analysis of variance.

EPsy 5262. Statistical Computing Using Minitab. (2 cr; prereq 5260 or equiv; S-N only; offered alt yrs)
Practical experience using time-sharing computer language MINITAB; applications of introductory statistical methods and concepts to data files.

EPsy 5263. Statistics for Preprofessional Students. (4 cr)
Descriptive statistics for continuous variables, simple regression and correlation, inferences on means, introduction to analysis of variance and multiple regression, contingency tables, computer analysis techniques.
EPsy 5280. Computer Programming: PASCAL. (3 cr; prereq sr; offered when feasible)

EPsy 5281. Introduction to Statistical Computing. (1 cr; S-N only)
Computing resources at the University; SPSS and MINITAB on MS DOS (Windows), VAX, and Macintosh; spreadsheets, editors, word processing, e-mail, and compilers. Data analysis applications.

EPsy 5400. Workshop: Counseling Psychology. (1-6 cr max 12 cr)
For all counselors, teachers, and administrators; aspects of intervention theory in relation to psychological principles; counseling, career development, assessment, psychological education, and consultation.

EPsy 5401. Counseling Procedures. (3 cr)
For persons whose professional work includes counseling and interviewing; not for licensure as school counselor. Emphasis on counseling relationship and principles of interviewing; case studies, role playing, and demonstration.

EPsy 5417. Clinical Use of Tests in Psychological Services. (3 cr; prereq 5221 or equiv, 5260 or equiv, CSPP major) Hummel.
Statistical methods related to test interpretation; critical review and selection of standardized tests.

EPsy 5420. Leadership and Administration of Student Affairs. (3 cr, §5420)
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

EPsy 5430. Foundations of Career Development. (3 cr) Hansen
Introduction: theory, research, practice; examination of concepts of work, work values, career and career education; application of theory and research to career guidance practice in educational, industrial, and community agency settings.

Provides students in counseling and allied fields with background; emphasis on counseling skills; topics include work and other life values, counseling process, planning and decision making, information and employment trends, sex equity in career options, needs of specific groups.

EPsy 5432. Career Development Programs and Organizational Change. (3 cr; prereq 5430 or 5431 or equiv or #) Hansen
Provides knowledge and skills to create and implement programs for a variety of populations and settings; life-roles concept integrated with systematic model of program development. Emphasizes new patterns of work and career, organizational change and interventions, and diversity issues in career development.

EPsy 5433. Developmental Career Counseling of Women. (3 cr) Hansen
Counseling skills and interventions to facilitate career development of girls and women at different life stages; sex role system, female socialization and stereotyping; facts, myths, and trends regarding women’s changing roles in technological society; issues of sexism in strategies and programs.

EPsy 5434. Counseling Adults in Transition. (3 cr) Romano
Psychological, physical, and social dimensions of transitions in adulthood, e.g., family and personal relationships, career. Adult development theory, stress and coping, and helping skills and strategies.

EPsy 5451. Seminar: The College Student. (3 cr, §EdPA 5540; prereq 6 cr psychology or educ psychology)
Psychology and sociology of college students; research concerning diversity of populations, vocational development of students, student society, culture, mental health, underachievement, dropouts, values and attitudes; relevant research methods.

EPsy 5461. Cross-Cultural Counseling. (3 cr) Thomas
Effect of cross-cultural and cross-national differences in counseling process.

EPsy 5531. Career Skills. (2 cr; prereq CSPP student or #) Hansen
Applied course is part of career counseling sequence and is coordinated with career development theories and field placement. Applications of theories from 5431 and practice through case studies, role plays, simulations, and assessments.

EPsy 5600. Childhood Language Development: Classroom Implications. (3 cr, §PsyS 5100) Turnure
Recent trends and findings in study of language acquisition and communication; classroom implications, including education of exceptional children.

EPsy 5601. Education of Exceptional Children. (4 cr)
Introduction to field of special education for classroom teachers and other school personnel.

EPsy 5602. Computer Technology in Special Education. (3 cr) Rose
Application of computer technology to special education in light of learning theory, principles of effective instruction, and the instructional needs of special education populations.

EPsy 5604. Transition From School to Work and Community Living for Persons With Special Needs. (4 cr)
Organization and design of training programs to promote independent living and vocational and community adjustment for persons with disabilities and for other at-risk populations; curriculum materials, methods, and organizational strategies for adolescent and adult learners, families, and community service providers.

EPsy 5605. Law and the Handicapped: Implications for Education. (2-4 cr, §EdPA 5223)
Analysis of recent litigation and legislation; emphasis on implementation of right to education, right to treatment, labeling, due process, and related issues.

EPsy 5607. Collaboration for Inclusive School Communities. (3 cr, §EdPA 5716)
Implications of and rationale and strategies for including students with unique needs (e.g., disabilities) in general education classroom settings. Importance of creating sense of community among students and adults in today’s heterogenous classrooms and schools.
GRADUATE PROGRAMS

EPsy 5608. Parent and Professional Planning for Handicapped Students. (3 cr)
Study and demonstration of constructive approaches to cooperative planning and implementation of education programs by parents, teachers, and persons involved with children who have special needs.

EPsy 5609. Family-Professional Planning for Persons With Severe Handicaps. (3 cr)
Interdisciplinary course on needs of families who have children with severe handicaps, emphasizing life-cycle needs, service issues, programs of support from infancy through adulthood, services from different agencies, disciplines, professional requirements, and responsibilities in serving families.

EPsy 5612. Education of Learning-Disabled Children. (3 cr) Deno, Espin
Analysis of considerations in design and conduct of services for learning-disabled children; approaches to education of such children.

EPsy 5615. Educational Interventions for Learning Disabilities. (3 cr; prereq 5612) Deno, Espin
Planning, implementing, and evaluating academic programs for students with disabilities in written and spoken language, quantitative concepts, and cognitive skills required for learning.

EPsy 5620. Introduction to Mental Retardation. (4 cr, §CPsy 5315; prereq 5601 or PsyS 5101 or #) Tumure
Issues relating to educational practices; community planning; educational philosophy, administration and organization, and programming.

EPsy 5621. Methods and Materials for Students With Mild to Moderate Mental Retardation. (4 cr, §PsyS 5121; prereq 5601 or PsyS 5101 or equiv) Rynders
Curriculum content, materials and methods of instruction for students with mental retardation; preparation of instructional instruments leading to both individual and group teaching expertise.

EPsy 5622. Programs and Curricula for Learners With Moderate to Severe Disabilities. (4 cr) Hupp
Elementary and secondary school program design and curricula. Preparing children and youth for integrated, normalized community environments in domestic living, leisure, and vocational domains. Developmentally appropriate programming. Structured observation of learners with severe disabilities.

Selected information in genetics; anatomy, physiology, and kinesiology; central and peripheral nervous system; prenatal, perinatal, and postnatal development; physically disabling conditions; and management and educational procedures.

EPsy 5625. Education of Infants and Preschool Children With Developmental Disabilities. (3 cr, §PsyS 5125; prereq 5601 or 5620 or PsyS 5101 or PsyS 5120 or #) Mcevoy, Rynders
Issues, problems, and practical applications in designing strong programs for young children with all types of disabilities.

EPsy 5626. Instruction for Learners With Moderate to Severe Disabilities. (4 cr; prereq 56116, 5622) Hupp
Data-based strategies for school and nonschool instruction: basic measurement principles; assessment, design, implementation, and instruction evaluation; concept and task analysis; natural and instructional cues, corrections, and consequences.

EPsy 5635. Education of Students With Physical Disabilities. (4 cr; prereq 5601 or PsyS 5101 or #) McEvoy, Rynders
Characteristics and abilities; methods and materials for training; observation of teaching situations involving these groups; personal consultation in addition to class hours.

EPsy 5636. Education of Multihandicapped Learners With Sensory Impairments. (3 cr; prereq 5601) Hupp
Characteristics of learners with visual and auditory impairments; design of instructional programs to remediate or circumvent disabilities, including use of prosthetic devices; related areas of performance affected by sensory impairments.

EPsy 5640. Psychological, Social, and Educational Aspects of Deafness. (3 cr, §PsyS 5140) Rose
Historical and current societal perceptions of deaf individuals; analysis of effects and patterns of hearing loss on children and adults; intelligence, personal and social adjustment, effect of psychological processes on acquisition of language, speech, and speechreading skills.

EPsy 5641. Models of Service Delivery to Students With Hearing Loss. (3 cr, §PsyS 5141; prereq 5644 or #) Rose
Programmatic systems of support for infants, children, and youth who are deaf or hard of hearing; educational delivery system models, curriculum and material adaptation, and consultation skills.

EPsy 5642. Classroom Communication Through ASL. (2 cr; max 6 cr) Hupp
Programmatic systems of support for infants, children, and youth who are deaf or hard of hearing; educational delivery system models, curriculum and material adaptation, and consultation skills.

EPsy 5643. Language for Deaf/Hard-of-Hearing Children. (4 cr, §PsyS 5143; prereq 5640 or PsyS 5140) Rose
Functional language development in communicatively disabled persons; overview of language curricula and programming strategies, pertinent research and models of instruction for use in educational environment.

EPsy 5644. Language Programming for Children With Hearing Loss. (3 cr, §PsyS 5144; prereq 5643 or #) Rose
Programs and practices focusing on development of language in deaf and hard-of-hearing infants, children, and youth; comparative study of language development among deaf, hard-of-hearing, and hearing persons.
EPsy 5646. Reading and Instructional Practices With Students Who Are Deaf or Hard-of-Hearing. (4 cr; prereq 5643 or #) Rose Knowledge and skills required to assess, plan, and implement instruction for individuals with hearing loss. Emphasis on theoretical and programmatic issues in acquisition of reading and writing skills, curricular adaptations, and effective instructional approaches.


EPsy 5648. Modes of Communication for Persons With Disabilities. (3 cr, §PsyS 5148) Rose Theoretical and applied study of selection and application of alternative communication modalities; assessment and development of modes including gestures, speech reading, cued speech, sign language, form boards, and technology-based systems.


EPsy 5656. Educational Needs of Students With Emotional Disturbances or Behavioral Disorders. (3 cr) Davis, Wilderson Preparation for specialists: educational characteristics, educational interventions, teaching of social behavior, legal and ethical issues.

EPsy 5657. Educational Interventions for Students With Emotional Disturbances or Behavioral Disorders. (3 cr; prereq 5656) Davis, Wilderson Preparation for specialists: assessment and planning procedures, interagency cooperation, career preparation and transition for EBD students.

EPsy 5660. Supervision and Administration of Special Education. (3 cr, §EdPA 5103) Procedures in establishing and improving educational programs for exceptional children.

EPsy 5670. Introduction to Education of Children With Visual Disabilities. (3 cr, §PsyS 5170) Knowlton Educational programs, services, and resources for blind and partially seeing children; historical background; philosophy; sociological and psychological problems.

EPsy 5671. Literary Braille. (3 cr; prereq 5670 or PsyS 5170) Knowlton Mastery of literary Braille code: analysis of specialized equipment with emphasis on use of Braille writers, slates, and computers for Grade 2 Braille transcription.

EPsy 5672. Advanced Braille. (3 cr; prereq 5671 or PsyS 5171) Knowlton Mastery of Nemeth Code of mathematics, introduction to foreign languages, computer notation, and consideration of Braille textbook formats and techniques; consideration of music Braille.

EPsy 5673. Methods of Teaching Children With Visual Disabilities. (4 cr, §PsyS 5173; prereq 5670 or PsyS 5170) Knowlton Principles of preparation, selection, and effective use of instructional materials and adaptive devices; adaptation of school environment; use of family, school, and community resources.

EPsy 5674. Orientation and Mobility Techniques for Students With Visual Disabilities. (3 cr, §PsyS 5174) Introduction to basic techniques to gain skills in pre-cane techniques, orientation to learning environment, construction of mobility maps; consideration of cane, guide dog, and telescopic aids to mobility.


EPsy 5676. Educational Management of Children With Visual Disabilities. (3 cr; prereq 5675 or #) Knowlton Advanced course evaluating and managing cognitive, psychosocial, and physical needs of students; consideration of parent, teacher, and student counseling.

EPsy 5680. Education of the Disadvantaged. (3 cr; prereq 12 cr psychology or educ psychology or sociology) Taborn Educational needs of children handicapped by behavior related to deficiencies of physical and/or cultural environment; adaptations of educational programs.


EPsy 5700. Assessment and Decision Making in Special Education. (3 cr) Deno For teachers and other educational personnel. Identifying needs of handicapped students; planning, monitoring, evaluating instructional programs; practice in use of standardized devices and development of clinical measures for handicapped students.

EPsy 5701. Practicum: Special Education. (Cr ar; prereq #) Observation of teaching practices or related work in schools or other agencies serving exceptional children.

EPsy 5702. Workshop: Special Education. (Cr ar; prereq #) Lab approach. Provides opportunities for school personnel to study specific problems related to special education.

EPsy 5704. Workshop: Interventions and Practices in Educational and Human Service Programs. (Cr ar; S-N only) Concepts, issues, and practices; development of educational and psychological support services in school and human service settings. For practicing professionals.
GRADUATE PROGRAMS

EPsy 5710. Contemporary Services for Persons With Developmental Disabilities. (3 cr) York-Barr
Survey of characteristics and service needs of persons with developmental disabilities using multidisciplinary approaches. Changing concepts, models of services, issues related to promoting self-determination, independence, productivity, and integration into the community.

EPsy 5714. Interagency Cooperation for At-Risk Populations. (3 cr, §EdPA 5104, §VoEd/WCFE 5806)
Overview of interagency planning issues and practices for educational and human service organizations. Transition of students from school to work and community living; infant and preschool services; use of locally based planning teams to achieve enhanced service coordination.

EPsy 5751. Student Teaching: Deaf, Hard-of-Hearing. (Cr ar; prereq #) Rose
Supervised experience in teaching or related work in schools or other agencies serving children with hearing impairments.

EPsy 5752. Student Teaching: Learning Disabled. (Cr ar; prereq #) Deno, Espin
Supervised experience in teaching or related work in schools or other agencies serving children with learning disabilities.

EPsy 5753. Student Teaching: Early Childhood Special Education. (Cr ar; prereq #) McEvoy
Supervised experience in teaching or related work in schools or other agencies serving children in early childhood special education.

EPsy 5754. Student Teaching: Emotional/Behavioral Disorders. (Cr ar; prereq #) Davis, Wilderson
Supervised experience in teaching or related work in schools or other agencies serving children with emotional/behavioral disorders.

EPsy 5755. Student Teaching: Mild to Moderate Intellectual Disabilities. (Cr ar; prereq #) Rynders, Tumure
Supervised experience in teaching or related work in schools or other agencies serving children with mild to moderate intellectual disabilities.

EPsy 5756. Student Teaching: Moderate to Severe Disabilities. (Cr ar; prereq #) Hupp
Supervised experience in teaching or related work in schools or other agencies serving children with moderate to severe disabilities.

EPsy 5757. Student Teaching: Physical and Health-Related Disabilities. (Cr ar; prereq #)
Supervised experience in teaching or related work in schools or other agencies serving children with physical and health-related disabilities.

EPsy 5758. Student Teaching: Visual Impairments. (Cr ar; prereq #) Knowlton
Supervised experience in teaching or related work in schools or other agencies serving children with visual impairments.

EPsy 5849. Assessment of the Preschool Child. (3 cr; prereq statistics or measurement or grad course in assessment) Christenson, M.Connell
Review of assessment of children ages 0-5 from developmental perspective; overview of normal and abnormal development; issues and techniques in cognitive, social, and emotional assessment; early education programs.

EPsy 5850. Creating Family-School-Community Partnerships for Educational Success. (4 cr)
Christenson
Theoretical and empirical bases; essential partnership variables; partnership models, programs, and strategies for K-12.

EPsy 5900. Independent Study. (Cr ar [max 12 cr]; prereq #)
Independent study in areas of special interest to students.

EPsy 8111. Knowledge and Skill. (3 cr; offered when feasible) Bart

EPsy 8115. Psychology of Instruction. (3 cr; prereq course in learning and/or instructional psychology) R. Tennyson
Identification and analysis of issues in development of instructional theory; review and analysis of research in teaching-learning processes in instruction; practice in design, development, evaluation of instructional techniques and technologies.

EPsy 8129. Research Problems: Learning and Cognition. (Cr ar; prereq #)
Formulation of research designs.

EPsy 8130. Personality Development and Socialization. (4 cr, §5130; prereq 1 grad course in personality or child psychology) McCarthy Veach
Major research strategies; emphasis on educational and developmental influences on personality.

EPsy 8131. Development of Moral-Political Judgment and Programs in Value Education. (2-4 cr; prereq #) 8149 recommended; offered when feasible) Narvaez

EPsy 8149. Research Problems: Personality. (Cr ar [max 9 cr]; prereq #)
Formulation of research topics and designs.

EPsy 8150. Psychology of Conflict Resolution. (3 cr) D. Johnson
Theory and research; practical applications. Nature of conflict, history of theorizing about conflict, strategies for resolving conflicts, distributive and integrative negotiations, third-party interventions.

EPsy 8153. Social and Psychological Influences on Individual Behaviors. (3 cr; prereq intro course in social psychology or #) Maruyama
Social and situational influences on individual behavior, focusing on effects of norms, peers, and others; situational characteristics affecting evaluation by self or others.

EPsy 8169. Research Problems: Social Psychology. (Cr ar; prereq #)
Formulation of research topics and designs.

EPsy 8210. Methods in Educational Research. (3 cr; prereq spring qtr PhD students only) Hummel
Methods and techniques employed in investigation and reporting of educational problems. Suggested for all candidates for graduate degrees.
EPsy 8220. Advanced Theory of Measurement. (3 cr; prereq 5221, 8261, PsyF 5121, PsyF 8111 or #; offered alt yrs) Davison
Principles underlying construction and use of psychological and educational measuring instruments, limitations of tests for purposes of measurement and evaluation. Students may register concurrently or subsequently for 8239 for individual extensions and applications.

EPsy 8221. Theory of Psychological Scaling. (3 cr; prereq 5221, 8261 or PsyF 5121, 8111 or #; offered alt yrs) Davison
Principles and theories underlying unidimensional scaling of properties of psychological behaviors, with minor attention to multidimensional scaling and mapping. Students may register concurrently or subsequently for 8239 for individual extensions and applications.

EPsy 8239. Problems: Measurement. (1-3 cr [max 3 cr])
Intensive study and individual research.

EPsy 8245. Seminar: Special Topics in Educational Evaluation. (3 cr; prereq 5240 or PsyF 5125 or #; offered when feasible) King

EPsy 8247. Internship: Evaluation. (3 cr [max 12 cr]; prereq #) King
Practical experience on an evaluation project. Student is given specified responsibilities under the supervision of an evaluator.

EPsy 8259. Problems: Evaluation. (Cr ar; prereq 5243 or 8245 or PsyF 5621 or 825) King
Designing, implementing, analyzing strategies. Students work on their own projects, on evaluation problems of schools in area, or on projects associated with national curriculum projects.

EPsy 8260, 8261, 8262. Statistical Methods. (3 cr per qtr; prereq 5260 or PsyF 5110 or Psy 3801 or equiv for 8260, 8260 for 8261, 8261 for 8262) Edwards, Hummel, MacEachern
Foundations of statistical theory; practice in applying theories in solution of educational and psychological problems.

EPsy 8263. Design and Analysis of Experiments. (3 cr; prereq 8262 or PsyF 8112 or #) Edwards
Functional approach to principles of efficient design of experiments and other types of observational programs; improved sampling techniques; methods of analyzing observational results.

EPsy 8264. Multiple Regression Analysis. (3 cr; prereq 5261 and 8261 or #5261 or PsyF 5111, PsyF 8111 or #) Davenport, Terwilliger
Techniques appropriate to analysis of data in education and behavioral sciences including polynomial regression, stepwise solutions, and analysis of variance; experience with computer applications.

EPsy 8265. Factor Analysis. (3 cr; prereq 5261, 8261 or #5261 or PsyF 5111, 8111 or #) Davenport, Terwilliger
Techniques appropriate to analysis of data in education and behavioral sciences including component, common factor, and image analysis; approaches to factor extraction, rotation, and factor score estimation; experience with computer applications.

EPsy 8266. Analysis of Results From Nonexperimental Research. (4 cr; prereq 8261 or PsyF 8511 or equiv or # Maruyama
Examination of quantitative techniques for drawing causal inferences, including path analysis, panel analysis, multitrait, multimethod analysis, structural equation approaches, and applications in social psychology of education.

EPsy 8279. Problems: Statistics for Students in Education and Psychology. (Cr ar)
Recent developments in statistical science; application to educational and psychological problems.

EPsy 8280. Statistical Computing Using SPSSX. (3 cr; prereq 8261 or equiv)
In-depth understanding of statistical package, SPSSX, on micro and mainframe; interpretation of results; attention to large-scale problems.

EPsy 8402. Individual Counseling: Theory and Procedures. (3 cr; prereq EPsy MA or PhD student with CSPP subprog or #) Romano
Theories of individual counseling and psychotherapy and their application.

EPsy 8403. Social/Cultural Contexts of Counseling: Theory and Procedures. (3 cr; prereq EPsy MA or PhD student with CSPP subprog or #) Hansen
Multicultural populations within United States, with focus on race, ethnicity, gender, and class. Systems interventions and social change. Students examine own biases as well as counseling and human development models and procedures for diverse groups.

EPsy 8404. Group Counseling: Theory and Procedures. (3 cr; prereq EPsy MA or PhD student with CSPP subprog or #) Romano
Theories and procedures of group process; ethical issues in group counseling.

EPsy 8410. Seminar: Advanced Counseling Research. (4 cr; prereq EPsy PhD student with CSPP subprog or #)
Analysis and integration of counseling research.

EPsy 8411. Seminar: Advanced Counseling Theory. (4 cr; prereq EPsy PhD student with CSPP subprog or #) Hummel
Comparative analysis of major models of counseling and psychotherapy.

EPsy 8412. Seminar: Counseling Ethics and Professional Development. (4 cr; prereq EPsy PhD student with CSPP subprog or #) Skovholt
Ethical and professional development of counseling psychologists.

EPsy 8413. Personality Assessment of Adults. (3 cr; prereq CSPP or counseling psychology doctoral student; offered alt yrs) Skovholt
Developing expertise in psychological assessment used in counseling clients in colleges and universities, agencies, and similar settings. Structured interviews, objective testing with MMPI, and using DSM3R criteria. Combining this data into written assessment report.

EPsy 8431. Master’s Seminar: CSPP. (Cr ar [max 6 cr]; prereq MA student, #) Hummel
Discussion of significant issues in the field.
GRADUATE PROGRAMS

EPsy 8435. Integrative Seminar: School Counseling. (3 cr; max 9 cr; prereq: CSPP student in school counselor licensure prog; not open to sr or MEd students, offered alt yrs; A-F only) Professional and ethical issues, problems, and programs related to students in practicum or internship settings.

EPsy 8450. Psychological Aspects of Counseling Supervision. (3 cr, §PsyS 8150; prereq: CSPP doctoral student or #) McCarthy Veach Consideration of theories; review of relevant research; demonstration and in-class practice of supervision skills.

EPsy 8501. Counseling Pre-Practicum. (3 cr; A-F only) McCarthy Veach Demonstration and in-class practice of individual helping skills.

EPsy 8502-8503-8504†. Counseling Practicum I, II, III. (4 cr each; prereq: CSPP MA student or #; A-F only) McCarthy Veach, Romano, Skovholt Supervised practice in counseling with individuals and groups; emphasis on systematic evaluation of progress through direct observations, video and audio tapes.

EPsy 8505. Field Placement in Counseling and Student Personnel Psychology. (1-3 cr [max 9 cr]; prereq: CSPP MA student or #) Supervised involvement of beginning M.A. students in appropriate agencies.

EPsy 8508. Group Counseling Skills. (2 cr; prereq: CSPP grad student, 8404 or #; S-N only) Romano Observation, practice, and processing of group counseling skills and techniques.

EPsy 8509. Supervision Practicum. (2 cr; prereq: 8450, CSPP doctoral student or #; A-F only) McCarthy Veach, Romano, Skovholt Supervised practice in development, management, and supervision of counseling practicum.

EPsy 8510. Internship: CSPP. (1-6 cr [max 9 cr; prereq: CSPP MA student or #] McCarthy Veach, Romano, Skovholt Supervised employment at department-approved sites.

EPsy 8513-8514-8515†. Counseling Practicum: University Counseling Services. (4 cr per qtr [max 9 cr]; prereq: #; S-N only) Levin, Loper Supervised experience in counseling at college and adult levels; 3 consecutive quarters beginning fall.

EPsy 8520. Counseling Practicum: Advanced. (1-3 cr [max 9 cr]; prereq: CSPP doctoral student; S-N only) Levin, Skovholt Opportunity to continue development of counseling skills. Each student assigned to senior staff member for supervision.

EPsy 8521. Practicum in Student Personnel Work. (1-3 cr [max 9 cr; prereq: 5420, 5451, 8404, 8504 or #) Supervised practice in college student personnel work in settings selected to match student interest.

EPsy 8612. Current Issues in Learning Disabilities. (4 cr; offered alt yrs) Deno, Espin Survey, analysis, application of relevant theories and research to current issues in the field; development of skill in scholarly inquiry, writing, and debate.

EPsy 8620. Psychological Theory and Research in Mental Retardation. (4 cr, §PsyS 8120; offered alt yrs) Turnure Review of research and theories in context of relevant developmental theories; important contributions in primary sources concerning principles of cognitive development and applied problems.

EPsy 8621. Functional Analysis of Behavior and Cognition in Persons With Mental Retardation. (4 cr, §PsyS 8121; prereq: 8620 or PsyS 8120 or #; offered alt yrs) Turnure Empirical approach to study of development in persons with mental retardation, emphasizing psychological research; procedures for deriving appropriate field applications; generating and implementing researchable questions.


EPsy 8677. Seminar: Issues and Research in Visual Impairment. (3 cr [max 9 cr; prereq: 5675, NSc 5031 or Psy 5031 or equiv) Knowlton Research findings from diverse disciplines on impact of visual impairment on social, cognitive, language, and motor development.

EPsy 8701. Seminar: Special Education. (4 cr; #) Special topics and schedules announced by department.

EPsy 8706. Single Case Designs for Intervention Research. (3 cr) Deno Design and analysis of single case experiments to examine effects of interventions on individual behavior in school, home, and community environments.

EPsy 8760, 8761. Seminar: Administration of Special Education. (3 cr per qtr, §EdPA 5180, §EdPA 5181; prereq: 5660 or PsyS 5160, EdAd 5103 or #) Weatherman Problems of administration and organization of special education programs.

EPsy 8770. Intervention Strategies for Persons With Developmental Disabilities: Interdisciplinary Perspectives. (3 cr; prereq: admission to educ to human servs grad prog or #) Bruininks, McConnell Introduction to principles and procedures.

EPsy 8811. Assessment Approaches in School Psychology II. (3 cr)
Assessment and decision-making issues, especially for determining eligibility for special education services and developing appropriate interventions for students with disabilities. Current practice in assessing students with disabilities; psychometric and legal perspectives on bias in assessment; and introduction to administration of scoring and interpretation of individualized assessment instruments.

EPsy 8812. Assessment Approaches in School Psychology III. (3 cr)
Final preparation for school practicum: students recommend comprehensive evaluation and suggest goals for future intervention. Factors affecting reliability of educational diagnosis and evidence for differential diagnosis; guidelines for planning interventions in schools; making placement decisions in special education; and introduction to multidisciplinary team (MDT) process.

EPsy 8813. Assessment Practicum in School Psychology. (2 cr; prereq 8810, 8811, 8812; school psychology student or #) Christenson, McConnell, Ysseldyke Administering assessment devices and communicating results in written and oral forms. Students practice content from 8810, 8811, and 8812 in assigned schools. Guided practice and supervision.

EPsy 8815. Program Development and Systems Consultation. (3 cr; prereq EPsy major) McConnell Theory underlying psychological interventions and analysis of interventions used in schools. Principles and models of consultation, process and content of intervention planning and program development, and analysis of primary and secondary prevention programs to promote competence of children and youth.

EPsy 8816. Instructional Intervention and Consultation. (3 cr; prereq EPsy major; A-F only) Casey, Christenson Theoretical considerations and training in use of functional techniques and appropriate preventive and remedial procedures. Emphasis on psychological implications of individual and classroom instructional practice and consultation skills with school personnel to address academic/instructional concerns.


EPsy 8818. Intervention Practicum in School Psychology. (1 cr; prereq 8815, 8816, 8817; school psychology student or #) Casey, Christenson, McConnell Observation of school psychologists in collaboration with educators and parents in intervention-related activities. Students design, implement, and evaluate effectiveness of an intervention with individual and/or groups of students under supervision of practicing school psychologists.


EPsy 8821. Seminar: School Psychology. (Cr ar) Casey, Christenson, Spicuzza, Ysseldyke Intensive study of significant topics from behavioral sciences as they apply to contemporary educational problems.

EPsy 8831!. Practicum: School Psychological Services. (1-5 cr; prereq EPsy major with school psychology subprog or #) Casey Typical functions of school psychologists; assessment procedures, case studies, consultation with parents, school personnel, and community agencies. Field experience under supervision, participation in seminar required.

EPsy 8832!. Clinical Practice in School Psychology. (1-5 cr; prereq 8810) Casey Supervised diagnosis and treatment of children referred to psychoeducational settings; training in broad range of approaches to problems of adjustment in school-age children, their families, schools, and community settings.

EPsy 8840!. Internship: School Psychological Services. (1-15 cr; prereq EPsy major with school psychology subprog or #; S-N only) Casey, Christenson Advanced field experience for doctoral candidates in school psychology.

EPsy 8841. Internship: Instruction and Supervision in School Psychology. (3 cr; prereq EPsy major with school psychology subprog or #) Christenson, McConnell, Spicuzza, Ysseldyke Experience and tutorial for doctoral candidates preparing to train school psychologists in higher education settings.


EPsy 8900. Research Problems. (Cr ar; prereq # except for sect 3) Research methodology and techniques; examination of literature; participation in formulating and executing research proposal.

EPsy 8905. Landmark Issues and Great Controversies in Educational Psychology. (3 cr; prereq 1st-yr EPsy doctoral student or #) Samuels Overview of intellectual history of educational psychology highlighting philosophical underpinnings, conceptual and theoretical milestones, major debates, and roots of critical issues.

EPsy 8910. Directed Study. (Cr ar; prereq # except for sect 3) Reading and analysis of research on selected problems.