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Duluth Degree Programs

General Information
At the University of Minnesota Duluth, the Graduate School offers programs for the master of fine arts in art (emphasis in graphic design); master of arts in communication sciences and disorders, criminology, and English (emphases in literary studies, English studies, and publishing and print culture); master of science in applied and computational mathematics, chemistry, computer science, geological sciences, integrated biosciences, and physics; master of business administration; master of science electrical and computer engineering; master of science engineering management; master of liberal studies; master of music; master of social work; and doctor of education in teaching and learning.

All-University M.S./Ph.D. programs in toxicology and water resources science are offered jointly with the Twin Cities campus. In addition, several graduate programs operate at the University of Minnesota Duluth under the aegis of graduate programs on the Twin Cities campus. Cooperative programs offered at both the master’s and doctoral levels include biochemistry, molecular biology, and biophysics; microbiology, immunology, and cancer biology; pharmacology; and cellular and integrative physiology. Students interested in these programs should see the Degree Programs and Faculty section of this catalog.

All programs are under the jurisdiction of The Graduate School dean and have admission, candidacy, and degree requirements comparable to their counterpart programs on the Twin Cities campus. General Graduate School regulations, including those for minimum degree requirements, apply to programs offered on the Duluth campus (see General Information at the beginning of this catalog).

Financial Aid and Other Assistance
Assistantships are normally granted through individual departments subject to stipulations described in General Information at the beginning of this catalog. Information about these assistantships can be obtained by writing to the department director of graduate studies. With an assistantship appointment of 25 percent or more, hospitalization and medical insurance coverage is provided at reduced cost.

Inquiries regarding loan funds, living accommodations, employment, and placement should be addressed to the Vice Chancellor for Academic Support and Student Life, University of Minnesota Duluth, 297 Darland Administration Building, 1049 University Drive, Duluth, MN 55812.

Program Descriptions
Brief descriptions of the various degree programs are listed on the following pages. Course offerings are listed in the University of Minnesota Duluth Catalog. General information concerning graduate work on the Duluth campus may be obtained from the Graduate School Office—Duluth, University of Minnesota Duluth, 431 Darland Administration Building, 1049 University Drive, Duluth, MN 55812. Information is also available at [www.d.umn.edu/grad](http://www.d.umn.edu/grad).

Key to Abbreviations

Faculty
Graduate faculty are listed at the beginning of each degree program. After the faculty name, the home department will be listed (unless the department is the same as the program name), followed by the graduate faculty status in the program. Professors emeriti are identified by “(emeritus).”

Membership Categories
Senior Member (SM)—Authorization to advise students at all levels, including the doctorate; to serve as a thesis reviewer and as an examiner on student examining committees, including service as chair of doctoral committees; to teach courses for graduate credit; and to participate in governance. In fields that also offer a professional doctorate, some senior member appointments may be restricted to the supervision of students seeking the professional degree.

Affiliate Senior Member (ASM)—Authorization to assume the same responsibilities as senior member, but not to participate in governance. In fields that also offer a professional doctorate, some affiliate senior member appointments may be restricted to the supervision of students seeking the professional degree.

Member/Advising (M2)—Authorization to advise students at the master’s level; to serve as a thesis reviewer at the master’s level and as an examiner on student examining committees at the master’s and postbaccalaureate certificate levels; to teach courses for graduate credit; and to participate in governance. At the discretion of the appointing program, may also include authorization to co-advice doctoral students with a senior member or affiliate senior member of the graduate faculty, and to serve as a thesis reviewer and examining committee member for doctoral students, but not as chair.

Affiliate Member/Advising (AM2)—Authorization to assume the same responsibilities as member/advising, but not to participate in governance.

Member (M)—Authorization to serve as a thesis reviewer at the master’s level and as an examiner on student examining committees at the master’s and postbaccalaureate certificate levels; to teach courses for graduate credit; and to participate in governance. At the discretion of the appointing program, may also include authorization to serve as a thesis reviewer and examining committee member for doctoral students, but not as chair.

Affiliate Member (AM)—Authorization to assume the same responsibilities as member, but not to participate in governance.

Examining Status (E)—Authorization to serve as a thesis reviewer and as an examiner on student examining committees at all levels, but not as chair, and to teach courses for graduate credit. Examining status does not include membership on the graduate faculty and does not confer governance privileges.

Tests
The following test abbreviations appear throughout graduate program listings.

ECFMG—Educational Commission for Foreign Medical Graduates

GMAT—Graduate Management Admission Test

GRE—Graduate Record Examination

IELTS—International English Language Testing System

MELAB—Michigan English Language Assessment Battery

SPEAK—Speaking Proficiency English Assessment Battery

TOEFL—Test of English as a Foreign Language

TSE—Test of Spoken English

USMLE—United States Medical Licensing Examination

For more information about these individual tests, see page 9 in the General Information section.
Applied and Computational Mathematics

Contact Information—Department of Mathematics and Statistics, University of Minnesota Duluth, 140 Solon Campus Center, 1117 University Drive, Duluth, MN 55812 (218-726-8747; fax 218-726-8399; math@d.umn.edu; www.d.umn.edu/math).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Richard A. Davis, Chemical Engineering, M2
Douglas J. Dunham, Computer Science, M2
Dalibor Pronek, M2
Joseph A. Gallian, M2
Richard F. Green, M2
Abu Rashid-Hasan, Chemical Engineering, M2
Barry R. James, M2
Jiann Shiou Yang, Electrical and Computer Engineering, M2

Associate Professor
Linda L. Deneen, Computer Science, M2
Guihua Fei, M2
John R. Greene, M2
Carmen M. Latterell, M2
Kathryn E. Lenz, M2
Robert L. McFarland, M2
Bruce B. L. Peckham, M2
Yongcheng Qi, M2
James W. Rowell, M2
Gary M. Shute, Computer Science, M2
Steven P. Sternberg, Chemical Engineering, M2
Steven A. Trogdon, M2

Assistant Professor
Marshall E. Hampton, M2

Curriculum—This program is for those wishing to pursue careers that use applied mathematics and statistics in science, industry, business, and teaching, and for those wishing to go on for Ph.D. degrees in mathematics or statistics. It emphasizes the use of modern modeling techniques and computational methods with areas of concentration available in continuous modeling, probability/statistics, and discrete mathematics. The faculty is drawn largely from the Department of Mathematics and Statistics but includes members from the Departments of Computer Science, Electrical and Computer Engineering, Chemical Engineering, and Biology.

Admission Requirements—Applicants should have completed an undergraduate degree in mathematics or statistics. However, a student with a degree in another major, and with a substantial background in mathematics or statistics (e.g., computer science or engineering), may also qualify; students lacking certain prerequisites may make up deficiencies concurrently with graduate work.

Applicants must submit scores from the General Test of the GRE, three letters of recommendation from individuals familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. Students may apply at any time; however, submission of all applications materials by January 15 for fall semester is strongly encouraged to ensure priority consideration for university fellowships. The deadline for applying for assistantships awarded for the next academic year is March 1. Students can be admitted any term. Students whose native language is not English must submit their TOEFL scores.

Use of 4xxx Courses—Inclusion of 4xxx courses (maximum of 8 credits) on degree program forms is subject to director of graduate studies approval.

M.S. Degree Requirements
The M.S. is offered under both Plan A (with thesis) and Plan B (without thesis). All students must complete at least 33 credits, of which at least 17 must be from approved mathematics or statistics courses or seminars (including a graduate seminar and two of the three core courses) and 6 must be from a minor or related field (statistics is a related field). As part of these 33 credits Plan A requires 10 thesis credits and Plan B requires a 2-credit project and an additional 8 credits from approved graduate-level mathematics, statistics, or related-field courses.

Language Requirements—None.

Final Exam—Written comprehensive exam and an oral final exam.

Minor Requirements for Students Majoring in Other Fields—A master's minor requires 6 credits in approved MATH or STAT courses.

Art—Graphic Design

Contact Information—Department of Art and Design, University of Minnesota Duluth, 317 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8225; fax 218-726-6532; art@d.umn.edu; www.d.umn.edu/art/program/mfa.htm).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Gloria Brush, M2
Virginia A. Jenkins, M2
James C. Klueg, M2

Associate Professor
Alison J. Aune-Hinkel, M2
Sarah Bauer, M2
Catherine Jo Ishino, M2
Janice D. Knetz, M2
Robert A. Repinski, M2
Robyn S. Roslak, Art History, M2

Assistant Professor
Steve Bardolph, M2
David W. Bowen, M2
Jennifer L. Dietrich, AM2
Jennifer A. Gordon, M2
Victoria D. Lehman, M2
R. Nakajima, M2
Joellyn J. Rock, M2
Eun-Kyung Suh, M2
Mariana M. Waisman, M2
Jennifer Webb, M2

Instructor
Rob Wittig, M

Curriculum—The master of fine arts with an emphasis in graphic design may be earned full- or part-time. All requirements for the master's degree must be completed and the degree awarded within seven years. Full-time students usually finish the program in five semesters. The department's financial aid does not extend beyond six semesters. Within a liberal arts setting, the program is tailored to each individual's educational, artistic and professional strengths. Expanding the boundaries of conventional design education, it includes the following areas of study: new media; motion graphics; print communication; design in the public realm; experience design; graphic design history, theory, and criticism; and preparation for college teaching. Academic study and studio practice are equally emphasized. The program draws on faculty with international and national experience as designers and artists who are recognized for the quality of their teaching, research, and professional design activities.

Admission Requirements—Applicants must have an undergraduate education and experience in the area of emphasis and a B.A., B.S., or B.F.A. in graphic design or art. Individuals with undergraduate degrees in other disciplines who have completed a substantial number of design courses or who have extensive professional graphic design portfolios also may be considered for admission. A portfolio of 20 design works (Mac format CD or DVD); a letter of intent; a writing sample (written in or translated into English); and three letters of recommendation are also required as part of the application. Applicants must have a minimum undergraduate GPA of 3.00. The GRE is not required. For more information about the M.F.A. visit the program’s Web site at www.d.umn.edu/art/program/mfa.htm. All additional program details, including complete application requirements and other information, are described fully in the Student Handbook that may be downloaded in PDF format from www.d.umn.edu/art/program/mfa.html Please read this handbook before submitting a final application.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to director of graduate studies approval.
Duluth Degree Programs

M.F.A. Plan B Degree Requirements
The M.F.A. is offered under Plan B and requires 60 credits. The time frame for completing the coursework and research is usually 3 years for full-time students. The Graduate School requires completion of the degree in 7 years. For more information on degree requirements please see M.F.A. handbook online at www.d.umn.edu/art/program/download/pdf/Grad_hbuke11-11-06.pdf

Language Requirements—None.

Final Exam—An oral exam based on the project and a supporting paper are required.

Business Administration

Contact Information—M.B.A. Department, Labovitz School of Business and Economics, University of Minnesota Duluth, 104 School of Business and Economics Building, 412 Library Drive, Duluth, MN 55812 (218-726-7281; fax 218-726-6936; febe@d.umn.edu; www.d.umn.edu/lsbe/mba/mba.php).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Curt L. Anderson, Economics, AM
Stephen B. Castleberry, Management Studies, M2
Richard W. Lichty, Economics, M2
Rodrigo J. Lievano, Finance and Management Information Sciences, M2
Patricia A. Merrier, Finance and Management Information Sciences, M2
Jerrold M. Peterson, Economics, AM
Jon L. Pierce, Management Studies, M2
Raymond L. Raab, Economics, M2
Stephen A. Rubenfeld, Management Studies, M2
Rajiv Vaidyanathan, Management Studies, M2
Shee Q. Wong, Finance and Management Information Sciences, AM

Associate Professor
Praveen Agarwal, Management Studies, M2
Geoffrey G. Bell, Management Studies, M2
Rodger L. Brannan, Accounting, AM
Anne Cummings, Management Studies, M2
Manjeet Dhatt, Finance and Management Information Sciences, M2
Sanjay Goel, Management Studies, M2
Kjell R. Knudsen, Management Studies, M2
Seung C. Lee, Finance and Management Information Sciences, M2
Dahui Li, Finance and Management Information Sciences, AM
Jerry W. Lin, Accounting, M2
A. Maureen O’Brien, Economics, M2
Linda Rochford, Management Studies, M2
Alan C. Roline, Accounting, M2

Assistant Professor
Patricia S. Borchert, M2
Jennifer G. David, Management Studies, M2
Saiying Deng, Finance and Management Information Sciences, M2
David Doorn, Economics, M2
Nik R. Hassan, Finance and Management Information Sciences, AM
Jennifer Mencel, Management Studies, M2
Jennifer Schultz, Economics, M2
Randall K. Skalberg, Accounting, AM
Bedassa Tadesse, Economics, M2
Gregory P. Trudeau, Accounting, AM
Joan S. Yang, Accounting, AM

Instructor
John L. Kratz, Management Studies, AM
Sebastian Oleas, Economics, M2
Peter J. Stark, Management Studies, AM
Shannon Studden, Management Studies, AM

Curriculum—The M.B.A. program meets the needs of those who are currently employed full-time in professional managerial careers and would like to pursue a graduate management education primarily on a part-time basis. The program offers courses in Duluth and Rochester, Minnesota. Most courses offered in Duluth meet one evening per week from 6:00 to 9:00 p.m. during the 15 weeks of the semester. Most courses offered in Rochester meet from 3:00 to 9:30 p.m. on Fridays and 8:00 a.m. to 12:30 p.m. on Saturdays every other week over a period of seven weeks. It is possible to enroll in the program on a full-time basis by registering for 6 or more credits per semester. However, only a relatively small number of domestic and international students are enrolled full-time.

Admission Requirements—Applicants must have a bachelor’s degree from an accredited college or university; completed foundation courses in accounting, economics, finance, production/operations, marketing, organizational management, and human resource management or be able to demonstrate knowledge and proficiency in each of these areas; and have an acceptable score on the GMAT, passed the Certified Professional Accountant (CPA) examination, or completed a graduate degree from an accredited college or university. In addition, international students must have an acceptable score on the TOEFL.

The bachelor’s degree may be in any field. However, students who have had little or no undergraduate or other education in business administration must complete foundation courses in the areas identified above before admission to the M.B.A. program. No graduate credit or credit toward M.B.A. program requirements is granted for prerequisite courses.

Use of 4xxx Courses—M.B.A. students may include 4xxx courses for electives in their degree programs subject to director of graduate studies approval.

M.B.A. Plan B and Coursework Only Degree Requirements
The M.B.A. requires 32 credits. All students must complete six core and three support area courses, which provide exposure to financial reporting, analysis, and markets; the domestic and global environments of business and organizations; the creation and distribution of goods and services; and human behavior in organizations. Also required are a capstone strategic management course and a minimum of 2 credits of cross-functional experience selected from special topics, workshops, projects, or field study. Students then choose one of two options for completing an additional 6 credits of elective coursework: coursework only or field research (Plan B).

Language Requirements—None.

Final Exam—For Plan B, students meet with their faculty committee for a final review of their completed project. For coursework only, no final exam is required.

Chemistry

Contact Information—Department of Chemistry and Biochemistry, 246 Chemistry Building, 1039 University Drive, Duluth, MN 55812 (218-726-7212; fax 218-726-7394; chem@d.umn.edu; www.d.umn.edu/chem_grad.html).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Ronald Caple, M2
Robert M. Carlson, M2
Lester R. Dreves, Biochemistry and Molecular Biology, M2
John F. Evans, M2
Vincent R. Magnuson, M2
Donald P. Poe, M2
Joseph P. Prohaska, Biochemistry and Molecular Biology, M2
James P. Riehl, M2
Bilin P. Tsai, M2
Kendall B. Wallace, Biochemistry and Molecular Biology, M2
Viktor Zhidankin, M2

Associate Professor
Benjamin L. Clarke, Medical Microbiology and Immunology, M2
Thomas E. Huntley, Biochemistry and Molecular Biology, M2
Paul Kiprop, M2
Keith B. Lodge, Chemical Engineering, M2
Elizabeth C. Minor, M2
Paul D. Siders, M2
Josef Werne, M2

Assistant Professor
Grant W. Anderson, Pharmacy, M2
Steven M. Berry, M2
Leng Chee Chang, M2
Robert T. Cormier, Biochemistry and Molecular Biology, M2
Joseph L. Johnson, M2
Venkatram R. Mereddy, M2
Viktor N. Nemynik, M2
Edward L. Perkins, Biochemistry and Molecular Biology, M2
Jon N. Rumbley, M2

Senior Research Associate
Subhash C. Basak, Natural Resources Research Institute, M2

Research Fellow
Pavel A. Krasutsky, Natural Resources Research Institute, M2

Curriculum—The M.S. program offers a broad-based education in chemistry that is well suited to students going on to Ph.D. programs, careers in industry, or...
professional schools. Both Plan A (with thesis) and Plan B (without thesis) are available. For Plan A, emphases include analytical, biological, inorganic, organic, and physical chemistry. The faculty includes members from the Department of Chemistry and Biochemistry and the Department of Chemical Engineering in the College of Science and Engineering, the Departments of Biochemistry and Molecular Biology and Medical Microbiology & Immunology in the Medical School Duluth, the College of Pharmacy, and the Natural Resources Research Institute.

Admission Requirements—Applicants must have completed an undergraduate chemistry major, including an upper division course in inorganic chemistry, one year of physical chemistry, mathematics through calculus, and one year of college physics, preferably taught using calculus. Students lacking some of these prerequisites may make up deficiencies concurrently with graduate work.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to director of graduate studies approval.

M.S. Degree Requirements
All students must complete 31 credits, including seminar and four core courses. All students must complete at least 14 credits in the major and at least 6 credits in a related field or minor. In addition, Plan A students must register for 10 thesis credits; Plan B students must complete an additional 10 course credits and write three papers. Attendance and presentation at the chemistry seminar are required. Individual programs are designed to best serve the interests of the student.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 6 credits in chemistry courses. Individual programs must be approved by the director of graduate studies in chemistry.

Communication Sciences and Disorders

Contact Information—Department of Communication Sciences and Disorders, University of Minnesota Duluth, 320 Bohannon Hall, 1207 Ordean Court, Duluth, MN 55812 (218-726-7678; fax 218-726-8693; cd@d.umn.edu; www.d.umn.edu/csd; masters/index.htm).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Paul N. Deputy, M2
Mark I. Mizuko, M2

Associate Professor
Kent R. Brorson, M2

Faith C. Loven, M2
Cynthia S. Spillers, M2

Instructor
Lynette R. Carlson, M2

Curriculum—The graduate program in communication sciences and disorders effectively combines academic and clinical endeavors to prepare students to become speech-language pathologists. The program places a major emphasis on the development of clinical skills, although students have the opportunity to engage in a wide variety of academic and research activities as well. The curriculum, which is based on five semesters of study, is accredited by the Council of Academic Accreditation (CAA) in speech-language pathology and also by the American Speech-Language-Hearing Association (ASHA).

Admission Requirements—Applicants must have a bachelor’s degree in communication sciences and disorders. Three letters of recommendation evaluating the applicant’s scholarship and clinical potential are required. At least two letters should be from academic faculty familiar with the applicant. A personal statement of the applicant’s short- and long-term goals is also required.

M.A. Plan B Degree Requirements
The M.A. is offered under Plan B only. At least 43 credits are required, including 31 credits of required CSD courses, 2 credits of Plan B project (CSD 8099), 4 credits of internship, and at least 6 credits of approved courses (4xxx and higher) from related fields. All Plan B projects must be pre-approved by the student’s examining committee, which also must give final approval.

Language Requirements—None.

Final Exam—The final exam is oral.

Computer Science

Contact Information—Department of Computer Science, University of Minnesota Duluth, 320 Heller Hall, 1114 Kirby Drive, Duluth, MN 55812 (218-726-7678; fax 218-726-8240; cs@d.umn.edu; www.d.umn.edu/cs; deg SID; grad). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Carolyn C. Crouch, M2
Donald B. Crouch, M2
Douglas, J. Dunham, M2
Richard F. Maclin, M2

Associate Professor
Theodore D. Pedersen, M2
Christopher G. Prince, M2
Gary M. Shute, M2
Masha Sosonkina, M2
C. Hudson Turner, M2

Assistant Professor
Peter J. Willemansen, M2

Curriculum—Computer science is a discipline that involves understanding the design of computers and computational processes. The discipline ranges from the theoretical study of algorithms to the design and implementation of software at the systems and applications levels. The M.S. is a two-year program that provides the necessary foundational studies for graduates planning to pursue either a Ph.D. in computer science or a career as a computer scientist in business or industry.

Admission Requirements—The program is designed for students with undergraduate degrees in computer science or computer engineering. These students should be able to enroll immediately in 8xxx computer science courses. Students with other backgrounds may be considered if they have completed the following courses or their equivalents: CS 1511-1521—Computer Science I-II; CS 2511—Software Analysis and Design; CS 2521—Computer Organization and Architecture; CS 3511—Computer Science Theory or both CS 451—Computability and Complexity and CS 4521—Algorithms and Data Structures; CS 5621—Computer Architecture or CS 5651—Computer Networks; and CS 5631—Operating Systems. Appropriate math prerequisites, namely MATH 1296-1297—Calculus I-II, and STAT 3611—Introduction to Probability and Statistics, are also required. Students who lack only a small number of these required courses may be admitted provisionally and must complete them before proceeding with their graduate work. The GRE General Test is required of all applicants; the TOEFL is also required of international students.

Use of 4xxx Courses—4xxx computer science courses may not be included in degree programs.

M.S. Degree Requirements
The M.S. is offered under Plan A (thesis) and Plan B (without thesis). At least 33 credits are required, including 16 credits from 8xxx courses in computer science, 1 credit of CS 8993, (seminar) and at least 6 credits from a minor or related field outside computer science. Plan A requires 10 thesis credits and Plan B requires a minimum of 10 credits in computer science at 8xxx or above. All courses are chosen in consultation with the student’s advisor, subject to approval by the director of graduate studies.

Language Requirements—None.

Final Exam—Students present a departmental colloquium, followed by an oral exam.

Minor Requirements for Students Majoring in Other Fields—A minimum of 6 credits in computer science is required for a master’s minor.
Criminology

Contact Information—Department of Sociology-Anthropology, University of Minnesota Duluth, 228 Cina Hall, 1123 University Drive, Duluth, MN 55812. (218-726-7551; fax 218-726-6386; crimma@d.umn.edu). www.d.umn.edu/crimlin/macrim_graduateprogram.php

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
John A. Arthur, M2
William A. Fleischman, M2
J. Clark Lauderberg, M2

Associate Professor
Sheryl J. Grana, M2
John E. Hamlin, M2
Jeffrey R. Maahs, M2
Robert R. Weidner, M2
Janelle L. Wilson, M2

Assistant Professor
Emily Gaarder, M2
Deborah M. Plechner, M2

Instructor
Denise S. Hasselton, M

Curriculum—The core courses for the M.A. in criminology feature relevant theoretical perspectives in understanding criminal behavior, methods of research and data analysis, and critical analysis of the criminal justice system. The curriculum is based on the premise that a liberal education in the social sciences includes the development of a student’s ability to a) define problems effectively by asking appropriate questions; b) understand and respect people with diverse opinions, backgrounds, characteristics, and lifestyles; c) respect the right of freedom of inquiry, to willingly challenge conventional wisdom, and to be intellectually flexible when challenged by factual information; and d) understand and the significance of inequality in the way that criminal justice is administered. The departmental theme of inequality is incorporated into the graduate program as it is in the undergraduate program. In particular, structural forms of oppression are examined, and emphasis is placed on issues of social justice, human rights, and treatment/rehabilitation.

The framework of the program provides students with opportunities to develop a knowledge base that enhances understanding of criminal behavior and the workings of the criminal justice system. Core requirements give students experience in utilizing various methods of research, analyzing and interpreting data, understanding and critiquing the main theoretical traditions in the field, and examining the organization of the criminal justice system. Furthermore, course electives enable students to focus on more specific interests (e.g., policing, courts, youth justice).

The M.A. in criminology provides an opportunity for both intellectual and professional development. The program serves those students with undergraduate degrees in criminology (or a related social science) who are interested in pursuing the advanced study of crime and justice. The program also serves those who have been employed in organizations and agencies who wish to expand their knowledge and understanding in ways that may enhance their professional career.

Admission Requirements—Applicants must have a baccalaureate degree from an accredited U.S. institution or a foreign equivalent for admission to the M.A. program.

Preference will be given to applicants with undergraduate degrees with majors in criminology, criminal justice, corrections, or sociology. Applicants with an undergraduate minor in criminology, criminal justice, corrections, sociology, law enforcement or a major in a related field may also be considered. Undergraduate degrees in criminology, criminal justice, corrections, or sociology of a related field from foreign universities may also be considered, as long as those degrees are equivalent to a four-year American university baccalaureate degree.

Applicants are expected to have successfully completed an introduction to criminology or criminal justice course, the equivalent of one semester of research methods and/or statistics beyond the introductory level, and a course devoted primarily to social/behavioral theory. The minimum GPA for regular admissions is 3.00 on a 4-point scale. Students with a GPA less than 3.00 are considered on an individual basis and may be admitted conditionally. Students admitted with a conditional status are reviewed after completing six credit hours of graduate work and are expected to have received grades of B or better and have successfully completed remedial work with grade(s) of B or better to receive full admission to the M.A. program.

Applicants must supply: official transcripts from all colleges and universities attended and three letters of recommendation evaluating the applicant’s scholarship and potential for graduate study. At least two letters should be from academic faculty familiar with the applicant. An essay explaining why an advanced degree in criminology is of interest and why the applicant merits serious consideration must also be submitted. The essay should include a personal statement of the applicant’s short and long-term professional goals and commitment and preparation for graduate study in criminology (1-2 pages). International students whose native language is not English are required to submit scores from the TOEFL examination (minimum scores of 550 [paper], 213 [computer], or 79 [Internet]).

Admission to the M.A. program is competitive.

Use of 4xxx Courses—Upon the advice and approval of the director of graduate studies, students may use 4xxx courses in related fields as appropriate. Sociology 4xxx courses may not be included in the degree programs.

M.A. Degree Requirements

The M.A. is offered under both Plan A and Plan B and each requires 38 credits. The Plan A option involves thesis work; the Plan B option involves a special project based upon a student’s practicum work. The Plan B paper combines theories, concepts, principles, and/or best practices from at least one course in the student’s program of study with work being done in a practicum. All students must take SOC 8100 (3 credits), SOC 8200 (4 credits) and SOC 8300 (3 credits). Plan A students must enroll in SOC 8777—Masters Thesis Credits (minimum of 10 credits required). Plan B students must enroll in SOC 8600—Criminology Practicum (minimum of 10 credits required). In addition to the credits listed above, all students must choose at least 12 additional credits in sociology courses, 5xxx or above. Students are expected to include additional elective courses (6 credits) outside the major (in a minor or related field) as part of their program of study. The choice and approval of related field courses is done in consultation with and approval of the student’s advising/examining committee.

Language Requirements—None.

Final Exam—Students present a department colloquium, followed by an oral examination.

Minor Requirements for Students

Majoring in Other Fields—A master’s minor requires 4 credits in methods/statistics, 3 credits in theory, and 3 elective credits.

Education—Teaching and Learning

Contact Information—Graduate School Office, University of Minnesota Duluth, 431 Darland Administration Building, 1049 University Drive, Duluth, MN 55812 (218-726-7523; mleone@d.umn.edu). www.d.umn.edu/educ/programs/edd.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Linda Miller-Cleary, M2
Tom Peacock, SM

Associate Professor
Frank Gulbrandsen, SM
Nedra Hazareesingh, M2
Mary Hermes, SM
Mary Ann Marchel, M2
Helen Mongan-Rallis, M2
Bruce Munson, M2
Terrie Shannon, M2
Joyce Strand, M2
Assistant Professor
Sue Danne, M2
Dan Glisicinski, M2
Trudie Hughes, M2
Joan Kwako, M2
Molly Minkinen, M2
Chang’aa Mweti, M2
Jacqueline Onchner, M2
Jean Stevenson, M2
Joan Varney, M2
Mary Wright, M2
Jiyoo Yoon, M2

Curriculum—The Ed.D. with a major in teaching and learning is an applied degree for the professional development of P-12, community college and university faculty and administrators, professionals in other human service professions such as coaching, athletic training, criminal justice, social work, extension, community agency administration, and university student personnel, as well as business professionals involved in education and training activities. The mission of the program is to produce scholarly practitioners. The goals of doctoral study in this program are to help students 1) acquire greater content knowledge in teaching and learning; 2) develop abilities for research in the field of teaching and learning; 3) evolve a broadened professional background in areas related to teaching and learning, such as systems and system interactions, and methods for program improvement; and 4) increase levels of cultural competence. Students will be immersed in research on best practices in teaching and learning, and will acquire the skills needed to apply best practices in their own schools and organizations.

Admission Requirements—Admission standards include: master's degree or a comparable foreign degree from a recognized college or university in education or a related field (e.g., special education, curriculum and instruction, human development, psychology, social work, management science, criminology); preferred minimum graduate GPA of 3.00; submission of GRE scores (preferred minimum score of 500 on verbal and quantitative portions); and a minimum TOEFL score of 550 (paper), 213 (computer), or 79 (Internet). The application must include three letters of recommendation, a minimum of three work samples (e.g., written reports, articles, presentations, curricula, or other professional artifacts), and a personal statement of career objectives. The statement of career objectives is used to evaluate how well this program meets the needs of the applicant. The director of graduate studies will conduct an initial evaluation of writing skills. GRE scores are considered as part of a holistic evaluation of the application. Students must also complete an assessment designed to determine an individual’s fit with the hybrid online delivery model. Results of the survey are used as part of the application evaluation.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

Ed.D. Degree Requirements
The Ed.D. requires 37 credits of core courses in research methodology, education, assessment, and policy. Students must also complete an additional 15 credits of coursework in related fields. Preliminary written and oral exams are required. Students must complete a thesis that contributes to the advancement of understanding or practice of teaching and education.

Language Requirements—None.

Final Exam—The final exam is an oral defense.

Electrical and Computer Engineering

Contact Information—Department of Electrical and Computer Engineering, University of Minnesota Duluth, 271 Marshall W. Alworth Hall, 1023 University Drive, Duluth, MN 55812 (218-726-6147; fax 218-726-7267; ece@d.umn.edu [www.d.umn.edu/ece]). For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html].

Professor
Stanley G. Burns, M2
Taek Mu Kwon, M2
Marian Stachowicz, M2
Jiann-Shiou Yang, M2

Associate Professor
Christopher R. Carroll, M2
Mohammed Hasan, M2
M. Imran Hayee, M2

Assistant Professor
Fernando Rios-Gutierrez, M2
Hua Tang, M2
Paul J. Weber, M2
George L. Zimmerman, AM2

Curriculum—The master of science in electrical and computer engineering (M.S.E.C.E.) combines scholarship and research in a program oriented towards students and engineering practitioners in the private and public sectors who are interested in advanced coursework and applied research. The program requires 31 credits in graduate coursework and research and focuses on core departmental strengths of design and implementation of computer hardware/software including digital circuits and VLSI, embedded controllers, computer networks, distributed computing, analog and digital circuit design and application, instrumentation, communication systems, soft computing, robotics, and control systems.

Admission Requirements—Applicants should have a bachelor's degree in electrical and/or computer engineering or related field by time of enrollment. Applicants should meet the general admission requirements of the University of Minnesota Graduate School. Preferred performance level is 3.00/4.00 GPA from an accredited U.S. institution or foreign equivalent. Two letters of recommendation concerning the student's readiness for graduate education and academic abilities are required. Minimum performance on the TOEFL is 550 (paper), 213 (computer), or 79 (Internet). GRE scores are recommended but not required. Industrial experience and professional licensure will be considered for admission. Previous graduate-level coursework completed after receiving a baccalaureate degree may qualify for transfer credit upon recommendation and approval by the M.S.E.C.E. director of graduate studies.

Use of 4xxx Courses—No more than 8 credits of ECE 4xxx courses may be used. Inclusion of 4xxx courses on degree program forms is subject to director of graduate studies approval.

M.S.E.C.E. Degree Requirements
The M.S.E.C.E. degree provides both thesis (Plan A) and non-thesis (Plan B) options. The Plan B option is primarily for new engineering graduates and practicing engineers who want and need more technical education than would be provided by courses and an applied research-oriented project component. The Plan A option is primarily for those students wishing to prepare themselves for Ph.D. studies and careers in research and academia.

Plan A students must complete a minimum of 31 semester credits in graduate courses. At least 15 credits must be electrical and computer engineering courses with at least 6 credits in courses numbered 4xxx or higher, 6 credits in courses numbered 5xxx or higher, and at least 3 credits in courses at 8xxx. An additional 6 credits in graduate level courses must be in a related field or minor. The student must register for a minimum of 10 semester-credits of M.S. thesis. The director of graduate studies must approve all programs.

Plan B students must complete a minimum of 31 credits in graduate courses. At least 9 credits must be ECE courses numbered 5xxx and higher with at least 3 of those credits numbered 8xxx, excluding colloquium and Plan B project credits. Of the remaining credits, twelve must be in ECE courses numbered 4xxx or higher. For the remaining 10 credits, at least 6 of these must be outside of electrical and computer engineering. The program cannot contain more than 4 credits from projects. The director of graduate studies must approve all programs.

Language Requirements—None.

Final Exam—A formal defense of the thesis is required for Plan A students. The final exam for Plan B is a formal report and oral presentation.
Minor Requirements for Students Majoring in Other Fields—A master’s minor requires 4 ECE courses. Individual programs must be approved by the director of graduate studies in electrical and computer engineering.

Engineering Management

Contact Information—Department of Mechanical and Industrial Engineering, University of Minnesota Duluth, 229 Voss-Kovich Hall, 1305 Ordean Court, Duluth, MN 55812 (218-726-8117; fax 218-726-8581; msem@d.umn.edu; www.d.umn.edu/mseM/). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm

Professor
Mark A. Fugelso, M2
Abu Rashid Hasan, Chemical Engineering, M2
Thys B. Johnson (emeritus), AM2
L. Alden Kendall (emeritus), M2
Richard R. Lindeke, AM2
David A. Wyrick, M2

Associate Professor
Emmanuel Enemuoh, M2
Ryan G. Rosandich, M2

Assistant Professor
Bill Pedersen, M2
John Voss, M2

Curriculum—The master of science in engineering management (M.S.E.M.) provides engineers with tools to more effectively manage people, projects, technology, and information in their careers to promote economic growth, competitiveness, ethical decision-making, and environmental responsibility. As people in engineering positions often manage technical projects of varying size and complexity, the M.S.E.M. provides an excellent foundation. To meet the needs of practitioners, courses are offered in the evening and are available to remote sites by interactive television. Full-time enrollment is possible and the course structure allows for unique research opportunities.

Admission Requirements—All applicants must meet the general admission requirements of the Graduate School. Applicants should have completed an undergraduate degree in an engineering discipline. However, an applicant with a degree in another technical major and with a substantial background in engineering may qualify. Such students may be admitted on a case-by-case basis and are asked to submit documentation that substantiates their engineering and technology experience and responsibilities.

Applicants must provide two letters of recommendation concerning their academic ability and readiness for graduate education. A minimum 3.00 GPA from an accredited U.S. institution or foreign equivalent is required. International students must submit a score of at least 550 (paper), 213 (computer), or 79 (Internet) for the TOEFL.

Use of 4xxx Courses—Upon the advice and approval of the director of graduate studies, students may use 4xxx courses in related fields as appropriate.

M.S.E.M. Degree Requirements
Plan A students must complete at least 31 credits, including a minimum of 12 credits in the major core sequence, 6 credits from a related field, a minimum of 3 credits of electives from EMGT, and 10 thesis credits. Individual programs are designed to best serve the interests of the student. The director of graduate studies must approve all programs.

Plan B students must complete at least 30 credits, including the 12-credit major core sequence, a minimum of 3 additional credits in the major, a 3-credit capstone project course, and 6 credits in a related field or minor. Students must complete an additional 6 credits in engineering management or other electives. The capstone project course requires a formal report and oral presentation. Individual programs are designed to best serve the interest of the student. The director of graduate studies must approve all programs.

Language Requirements—None.

Final Exam—A formal defense of the thesis is required for Plan A students. The final exam is a formal report and oral presentation in EMGT 8310 for Plan B students.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires 6 credits in engineering management courses. Individual programs must be approved by the director of graduate studies in engineering management.

English

Contact Information—Department of English, University of Minnesota Duluth, 410 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8228; fax 218-726-6882; engl@d.umn.edu; www.d.umn.edu/engl/englishgrad/maint/index.php). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm

Professor
Stephen J. Adams, M2
Thomas D. Baczig, Sociology-Anthropology, M2
Martin F. Bock, M2
Thomas J. Farrell, Composition, M2
William A. Gibson (emeritus), Composition, AM2
Michael D. Linn, Composition, M2
Joseph C. Maiolo, M2
Linda Miller-Cleary, M2

Associate Professor
Katherine L. Basham, M2
Carol A. Bock, M2
Paul D. Cannan, M2
Jill D. Jensen, Composition, M2
Roger C. Lips, M2
Kenneth C. Risdon, Composition, M2
Carolyn Sigler, M2
Craig Stroupe, Composition, M2
Krista Sue-Lo Twu, M2

Assistant Professor
David E. Beard, Composition, M2
Richard Hillyer, AM
Chongwon Park, Composition, M2
John D. Schwetman, M2
Dometa J. Wiegand, AM
Mary F. Wright, Education, AM

Instructor
Margaret T. Preus, AM
Rob Wittig, Art and Design, AM

Curriculum—The M.A program offers courses in English, Irish, and American literature; creative writing; linguistics; composition and rhetorical theory; book history; publishing; and English education. The program has three master’s emphases: a literary studies emphasis for concentrated study of literature, an interdisciplinary emphasis in English studies, and an emphasis in publishing and print culture.

Admission Requirements—Students applying to this program must submit GRE General Test scores, two writing samples such as course papers, and three letters of recommendation. Entering students should have completed at least 30 semester credits in English (these may include credits in literature, language, and advanced composition), including 20 credits of upper division English courses that offer broad coverage of English and American literature and at least one course in English language or English linguistics. Any deficiencies are determined by the director of graduate studies in consultation with the graduate committee. Certain course prerequisites may be taken concurrently with graduate work and may be applied toward degree requirements.

Use of 4xxx Courses—Upon approval of the director of graduate studies, use of 4xxx courses is permitted for courses taken to satisfy requirements in a related field. 4xxx courses in English, composition, and linguistics may not be included on degree program forms in English.

M.A. Plan B Degree Requirements

Literary studies emphasis: a minimum of 30 credits, including at least 24 credits in the major, 6-8 credits in a related field, and two Plan B projects.

English studies emphasis: a minimum of 31 credits, including at least 25 credits in the major distributed in literature, linguistics, and composition/rhetoric; 6-8 credits in a related field; and two Plan B projects.

Publishing and print culture: a minimum of 31 credits, including at least 25 credits in the major distributed in literature, publishing, and print culture; 6-8 credits in a related field; and two Plan B projects.
Curriculum—The M.S. program in geological sciences includes areas of economic geology, geophysics, glacial geology and geomorphology hydrogeology, igneous and metamorphic petrology, isotope and aqueous geochemistry, limnogeology, paleoclimatoloy, planetary geology, sedimentary and stratigraphy, surface processes, and structure tectonics. See the geology Web site at www.d.umn.edu/geology.

Admission Requirements—Applicants must have completed an undergraduate major in geology, geophysics, or related earth science with one year each of college mathematics (including calculus), chemistry, and physics. Field camp and/or undergraduate research experience is recommended. GRE General Test scores are required.

Research Facilities—Research facilities include those for microscopy, XRD, isotope and trace element analysis, digital imagery, ground-penetrating radar, and near-surface seismic profiling. There is a departmental computer lab and ready access to the mainframe system. Additional facilities are available at the Large Lakes Observatory (including an 86-foot research vessel) and at the Natural Resources Research Institute (including a GIS system), both affiliated with UMD, and the Department of Geology and Geophysics in Minneapolis (particularly an electron microprobe lab).

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements—The M.S. is offered under Plan A (thesis) and Plan B (non-thesis). Courses are selected with approval of the student’s adviser and the director of graduate studies. All courses must be at 4xxx, 5xxx or 8xxx.

For Plan A, a candidacy exam that involves oral defense of written thesis research proposal during the second semester of residency is required. Plan A requires 31 credits, including 14 course credits in the major, 6 course credits in a minor or related field, 1 credit course (GEOL 8200), and 10 thesis credits.

For Plan B, a written candidacy exam during the second semester is required. Plan B requires 31 credits in approved courses, including three Plan B papers.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 6 credits and is decided in consultation with the student’s adviser and the director of graduate studies in geology.

Integrated Biosciences

Contact Information—Integrated Biosciences Graduate Program, University of Minnesota Duluth, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218-726-7750; fax: 218-726-8142; bios@umn.edu; www.d.umn.edu/bioscience).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Mustafa N. al’Absi, Behavioral Sciences, M2
Matthew T. Andrews, M2
Subhash C. Basak, Natural Resources Research Institute, M2
Jeremy A. Beilman, Surgery, Twin Cities, M2
Yosief Cohen, Fisheries, Wildlife and Conservation Biology, Twin Cities, M2
Lester R. Drewes, Biochemistry and Molecular Biology, M2
Barbara A. Elliott, Family Medicine and Community Health, M2
Goran B. Hellemant, Physiology and Pharmacology, M2
Lois J. Helly, Physiology and Pharmacology, M2
Randall E. Hicks, M2
Brian H. Hill, AM2
Alan B. Hooper, Biochemistry, Molecular Biology and Biophysics, Twin Cities, M2
George E. Host, M2
John R. Kelly, AM2
David R. Mount, AM2
Gerald J. Niemi, M2
John J. Pastor, M2
Joseph R. Pohaska, Biochemistry and Molecular Biology, M2
Jean F. Regal, Biochemistry and Molecular Biology, M2
Patrick K. Schoff, M2
George J. Trachte, Pharmacology, M2
Kendall B. Wallace, Biochemistry and Molecular Biology, M2

Adjunct Professor
Janet R. Keough, M2
Carl Richards, M2

Associate Professor
Gerald T. Anklepy, Fisheries, Wildlife and Conservation Biology, Twin Cities, M2
Edgar Arriaga, Chemistry, Twin Cities, M2
Donn K. Cranstonr, M2
Benjamin L. Clarke, Medical Microbiology and Immunology, M2
Timothy P. Craig, M2
Janet L. Fitzakerley, Pharmacology, M2
M. K. Froberg, Pathology and Laboratory Medicine, M2
Jon M. Holy, Anatomy and Cell Biology, M2
Thomas R. Hrabik, M2
Rodney D. Johnson, AM2
Allen Mensinger, M2
Ayma N. Noreddin, Pharmacy, M2

Assistant Professor
Grant W. Anderson, Pharmacy, M2
Lucia P. Barker, Medical Microbiology and Immunology, M2
Steven M. Berry, Chemistry, M2
Clay J. Carter, M2
Sigmund J. Degitz Jr., AM2
Haim Einat, Pharmacy, M2
Julie R. Etterson, Plant Biology, M2
Duluth Degree Programs

Joseph L. Johnson, Chemistry, M2
Tim L. Kroft, M2
Tali D. Lee, M2
Edward L. Perkins, Biochemistry and Molecular Biology, M2
Teresa Rose-Hellevik Physiology and Pharmacology, M2
Jon N. Rumbley, Chemistry, M2
Gregory Rutkowski, Pharmacy, M2
Patricia M. Scott, Biochemistry and Molecular Biology, M2
Chaela Tan, Pharmacy, M2

Research Associate
Richard P. Axler, Natural Resources Research Institute, M2
Valerie J. Brady, Natural Resources Research Institute, M2
Ron Moen, Natural Resources Research Institute, M2
Eutan D. Reavie, Natural Resources Research Institute, M2

Curriculum—The program offers two areas of emphasis: cell, molecular, and physiological biology (CMP); and ecology, organismal, and population biology (EOP).

Admission Requirements—Applicants must have a bachelor’s degree or equivalent in the biological or physical sciences or a related field from an accredited college or university. Applicants should have taken at least one year of chemistry, one year of physics, and one semester of calculus. Because of the integrative nature of the program, a wide variety of scientific backgrounds are considered for admission to the IBS program, and applicants are expected to have taken advanced science in preparation. Thus, courses in advanced chemistry, biology, additional calculus and introductory statistics are strongly encouraged and are viewed favorably. Examples of advanced knowledge and subdisciplines include, but are not limited to, biochemistry, botany, cell biology, developmental biology, ecology, evolution, genetics, immunology, limnology, microbiology, molecular biology, neuroscience, physiology, physical chemistry, psychology, and zoology.

Applicants deficient in some of these requirements may be admitted with the proviso that these courses are completed within the first year of the program. Coursework used to make up deficiencies may not be applied toward fulfillment of the graduate degree.

As part of their application materials, applicants must also submit GRE General Test scores not more than two years old.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.S. Plan A Degree Requirements
The M.S. is offered under Plan A (coursework and thesis). Students must complete at least 14 course credits in the major; a minimum of 6 credits of electives in another graduate program or programs (for a minor or related field) or in an IBS emphasis other than that which comprises the major program; and at least 10 thesis credits.

Core curriculum for all IBS students consists of 14 credits: IBS 8011, IBS 8012, IBS 8099, STAT 5411, IBS 8020, IBS 8030, and IBS 8077.

Students must designate an area of emphasis during their second semester. The additional course requirements of each emphasis are as follows:

**EOP Emphasis**
IBS 8201—Ecological Processes (2 cr)
Electives (7 cr)

**CMP Emphasis**
IBS 5101—Biochemistry Molecular Biology or IBS 8102—Cell Molecular Development Biology (3 cr)
IBS 8103—Comparative Animal Phys (3 cr) or BIOL—5061 Plant Physiology (2 cr)
Electives (3 cr)

Language Requirements—None.

Final Exam—Students must present a department seminar and pass a final oral exam.

**Liberal Studies**

Contact Information—College of Liberal Arts, M.L.S. Program, University of Minnesota Duluth, 494 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8149; fax 218-726-6386; mls.cer@d.umn.edu; www.d.umn.edu/mls.html).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Stephen Adams, English, M2
John Arthur, Sociology-Anthropology, M2
Elizabeth Bartlett, Women’s Studies, M2
William Fleischman, Sociology-Anthropology, M2
Thomas F. Hedin, Art, M2
Tom K. Isbell, Theatre, M2
Lawrence Knopp, Geography, M2
Michael W. Pfau, Communication, M2
Richard A. Seybolt, Foreign Languages and Literatures, M2
Judith Ann Trolander, History, M2

Associate Professor
Mirta C. Emad, Sociology-Anthropology, M2
Scott Freundschuh, Geography, M2
Milan Kovacovic, Foreign Languages and Literatures, M2
Rohby S. Roslak, Art, M2
Maureen Tobin Stanley, Foreign Languages and Literatures, M2
Steven J. Vanderheiden, Political Science, M2
Robert R. Weidner, Sociology-Anthropology, M2
Janelle L. Wilson, Sociology-Anthropology, M2
Gesa Zinn, Foreign Languages and Literatures, M2

Assistant Professor
Eleanor Hannah, History, M2
Thomas F. Powers, Political Science, M2
Rosemary Stanfield-Johnson, History, M2

Curriculum—The interdisciplinary M.L.S. is a community outreach program that provides citizens with the opportunity to return to higher education to broaden their intellectual horizons without having to focus on specific professional goals. Two emphases include the traditional M.L.S. or an ecology, economics, and ethics emphasis. In both emphases, students write one to three papers exploring in depth an interdisciplinary topic.

Admission Requirements—Applicants must have a bachelor’s degree from a recognized college or university with a 3.00 GPA. The application should include three letters of recommendation and a thoughtfully composed letter stating, in narrative form, reasons for wishing to pursue the M.L.S. and describing education and career experiences. This letter should be addressed to the director of graduate studies in the UMD Graduate School Office.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.L.S. Plan B Degree Requirements
The M.L.S. is offered under Plan B only. Students in either emphasis must complete 32 credits, including at least 4 credits of IS 8001—Introduction to Liberal Studies. Those students electing the traditional emphasis must also take 4 credits of IS 8501—Seminar: Ethics and the Human Condition and 24 elective credits. Students selecting the ecology, economics, and ethics emphasis must also take 4 credits of IS 8250—Ecological Economics, 4 credits of IS 8502—Ecology, Economics, and Ethics, and an additional 20 credits of electives. One to three Plan B papers are required in both emphases.

Language Requirements—None.

Final Exam—The final exam is oral.

**Linguistics**

Minor Only

Contact Information—Program in Linguistics, University of Minnesota Duluth, 435 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8131; fax 218-726-6882; mls.cer@d.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Michael D. Linn, Composition, M

Associate Professor
Jonanthan B. Conant, Foreign Languages and Literatures, M

Milan Kovacovic, Foreign Languages and Literatures, M

Assistant Professor
Chongowon Park, Composition, AM
Music

**Curriculum**—Linguistics, offered interdepartmentally and through the Department of Interdisciplinary Programs, may be elected by graduate students as a related field, or with approval of the director of graduate studies of the major, as a designated minor.

**Minor Only Requirements**
The minor in linguistics requires a minimum of 6 credits selected from ANTH 4628—Language and Culture (3 cr), ENGL 5811—Introduction to Modern English (4 cr), ENGL 5821—History of the English Language (4 cr), LING 5195—Special Topics (3 cr), LING 5802—Applied Linguistics (4 cr), LING 5852—Practicum in Teaching Linguistics (3 cr), LING 8500—Graduate Seminar (3 cr), and LING 8591—Independent Study in Linguistics (1-3 cr).

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**Admission Requirements**—An undergraduate degree in physics or the equivalent is required.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**M.S. Degree Requirements**
The M.S. is offered under Plan A (with thesis) and Plan B (without thesis). All students take 11 credits in a common core of courses (including PHYS 5501, 5511, 5521, and 2 credits in 5090), 3 credits in a methods course (PHYS 5052 or 5053 or 5061), and 6 credits in a minor or related field. Plan A also requires 10 thesis credits. Plan B requires one or more projects for a total of 120 hours of work, preparation of a written report for each project, and 10 additional course credits in physics. These courses may include 4xxx courses if appropriate and if approved for graduate credit; for distinctly interdisciplinary programs, the courses may be outside physics. In all cases, the overall plan of study and selection of elective courses must form a coherent program and be approved by the director of graduate studies.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—A master’s minor requires 6 credits, of which no more than 1 credit can be from PHYS 5090.

**Social Work**

**Curriculum**—The M.S. program provides a grounding in the fundamentals of social work, combined with significant research involvement. The primary areas of research are computational physics, high-energy neutrino physics, experimental work in condensed-matter physics, and observational and theoretical work in physical limnology.

**Admission Requirements**—An undergraduate degree in social work or the equivalent is required.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**M.S. Degree Requirements**
The M.S. is offered under Plan A (with thesis) and Plan B (without thesis). All students take 10 credits in a common core of courses (including PHYS 5501, 5511, 5521, and 2 credits in 5090), 3 credits in a methods course (PHYS 5052 or 5053 or 5061), and 6 credits in a minor or related field. Plan A also requires 10 thesis credits. Plan B requires one or more projects for a total of 120 hours of work, preparation of a written report for each project, and 10 additional course credits in social work. These courses may include 4xxx courses if appropriate and if approved for graduate credit; for distinctly interdisciplinary programs, the courses may be outside social work. In all cases, the overall plan of study and selection of elective courses must form a coherent program and be approved by the director of graduate studies.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—A master’s minor requires 6 credits, of which no more than 1 credit can be from PHYS 5090.

**Physics**

**Curriculum**—The M.S. program provides a grounding in the fundamentals of physics, combined with significant research involvement. The primary areas of research are computational physics, high-energy neutrino physics, experimental work in condensed-matter physics, and observational and theoretical work in physical limnology.

**Admission Requirements**—An undergraduate degree in physics or the equivalent is required.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**M.S. Degree Requirements**
The M.S. is offered under Plan A (with thesis) and Plan B (without thesis). All students take 11 credits in a common core of courses (including PHYS 5501, 5511, 5521, and 2 credits in 5090), 3 credits in a methods course (PHYS 5052 or 5053 or 5061), and 6 credits in a minor or related field. Plan A also requires 10 thesis credits. Plan B requires one or more projects for a total of 120 hours of work, preparation of a written report for each project, and 10 additional course credits in physics. These courses may include 4xxx courses if appropriate and if approved for graduate credit; for distinctly interdisciplinary programs, the courses may be outside physics. In all cases, the overall plan of study and selection of elective courses must form a coherent program and be approved by the director of graduate studies.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—A master’s minor requires 6 credits, of which no more than 1 credit can be from PHYS 5090.

**Social Work**

**Curriculum**—The M.S. program provides a grounding in the fundamentals of social work, combined with significant research involvement. The primary areas of research are computational physics, high-energy neutrino physics, experimental work in condensed-matter physics, and observational and theoretical work in physical limnology.

**Admission Requirements**—An undergraduate degree in social work or the equivalent is required.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**M.S. Degree Requirements**
The M.S. is offered under Plan A (with thesis) and Plan B (without thesis). All students take 10 credits in a common core of courses (including PHYS 5501, 5511, 5521, and 2 credits in 5090), 3 credits in a methods course (PHYS 5052 or 5053 or 5061), and 6 credits in a minor or related field. Plan A also requires 10 thesis credits. Plan B requires one or more projects for a total of 120 hours of work, preparation of a written report for each project, and 10 additional course credits in social work. These courses may include 4xxx courses if appropriate and if approved for graduate credit; for distinctly interdisciplinary programs, the courses may be outside social work. In all cases, the overall plan of study and selection of elective courses must form a coherent program and be approved by the director of graduate studies.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—A master’s minor requires 6 credits, of which no more than 1 credit can be from PHYS 5090.
curriculum has a special focus on services to American Indians and their communities. Coursework is also available in the area of child welfare practice. The M.S.W. program is accredited by the Council on Social Work Education.

**Admission Requirements** — 1) A bachelor’s degree from a regionally accredited college or university. The bachelor’s degree should include a solid background in the liberal arts, as evidenced on the transcript by courses in the arts, cultural studies, and behavioral and social sciences. Applicants should be knowledgeable about diverse cultures, social problems, social conditions, and the social, psychological, and biological determinants of human behavior. Applicants with undergraduate degree majors in social work or a related field or discipline are given preference over applicants with other majors. 2) Completion of at least 15 semester credits in two or more social science disciplines, such as sociology, psychology, economics, anthropology, or political science. 3) Strong academic preparation as demonstrated by a minimum undergraduate GPA of 3.00. 4) Potential to contribute to the social work profession. Preference is given to applicants with professional experience in human service settings, particularly when this experience involves working with underrepresented and protected classes.

**Enrollment Prerequisites** — Admitted applicants must complete a college-level biology course with content on human anatomical and physiological development and a college-level statistics course. The biology course must be completed before registering for the first semester in the M.S.W. program, and the statistics course must be completed before registering for the first research course. Interested persons can apply and be admitted before completing the enrollment prerequisites.

**Advanced Standing** — Applicants with a bachelor of social work degree from a program accredited by the Council on Social Work Education may apply for admission to the advanced standing program. All other applicants are ineligible for this program.

**Use of 4xxx Courses** — Inclusion of 4xxx courses on degree programs forms is subject to adviser and director of graduate studies approval.

**M.S.W. Degree Requirements**
The M.S.W. requires 51 credits (34 credits for students admitted with advanced standing), including a minimum of 41 credits in social work courses (28 credits for advanced standing students), and a master’s project and final examination. The program requires two field placements in human service agencies (one field placement for students with advanced standing). A minimum GPA of 3.00 for courses included in the degree program is required. A level of personal and professional competence considered satisfactory for entrance into the profession of social work, as indicated by course and field placement evaluations, is required.

**Language Requirements** — None.

**Final Exam** — None.

**Related Fields**
Graduate degree programs do not exist in the following fields. However, students may earn graduate credit in courses related to their program and use faculty members on their examining committees from these fields. For graduate courses, see the Courses section of this catalog.

**American Indian Studies**
*Professor* John G. Red Horse, E

**Anthropology**
*Professor* Linda S. Belote, E
Michael D. Linn, Composition, E
Ron T. Marchese, E
Tim Roufs, E
*Assistant Professor* Jennifer E. Jones, E
David Syring, E

**Art History**
*Professor* Thomas F. Hedin, E
*Associate Professor* Robyn Roslak, E

**Behavioral Sciences**
*Professor* Mustafa N. al’Absi, E
James G. Boulger, E
Barbara A. Elliott, Family Medicine and Community Health, E
Frederic W. Hafferty E
*Associate Professor* Gary L. Davis, E
Richard G. Hoffman, E

**Chemical Engineering**
*Professor* Richard A. Davis, E
Abu R. Hasan, E
*Associate Professor* Keith B. Lodge, E
Steven P. Sternberg, E
*Assistant Professor* Michael A. Rother, E
Gregory Rutkowski, Pharmacy, E

**Communication**
*Professor* Michael J. Sunnafrank, E
*Associate Professor* Virginia T. Katz, E
Linda T. Krug, E
Elizabeth J. Nelson, E
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Below is an alphabetical list of course designators and their referents under which courses are organized within the Courses section of this catalog. The list is provided to help students find the full description of prerequisite courses and identify the programs to which the courses apply. Directly following each designator and its referent is a “see” note in cases where the program name or names differ from the referent. For example, courses in physiology (PHSL) pertain to the cellular and integrative physiology program.

Courses in fields that do not offer graduate programs, but which may be taken for graduate credit if related to a student’s program, also appear in the course section; their designators and referents below are followed by “related courses.”

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