

*University of Wisconsin
Oshkosh*

Mathematics

Student Handbook

2011-2012



Check It Out!

UW Oshkosh

Department of Mathematics

Welcome to the Mathematics Department! As a student interested in mathematics, you should find the information in this handbook useful in many ways. Principally, it is designed to familiarize you with our programs and activities, and to introduce you to the Mathematics Department as a group of individuals sharing a common interest. We are the people behind the programs you will read about in the handbook; we hope you get to know us as we work together and move forward in the teaching/learning process.

If the following information does not provide the answers to all of your questions, talk to your advisor, your classroom instructor, or any mathematics department member. He or she is your best source of information about our programs. You can reach us by calling (920) 424-1333 or email us at math@uwosh.edu

You can also visit us at our website www.uwosh.edu/departments/mathematics. We hope your stay at UW Oshkosh will be intellectually exciting and enjoyable.

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Mathematics Department
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Faculty

John Beam, Associate Professor, Ph.D. (2002) University of Miami
Research Interest: Probability, Mathematics Education

Jason Belnap, Assistant Professor, Ph.D. (2005) The University of Arizona
Research Interests: Mathematics Education: Professional Development of Teachers and the Group Construction of Knowledge through Discourse

Zoubir Benzaid, Professor, Ph.D. (1985) University of Wisconsin Milwaukee
Research Interest: Control Theory, Mathematical Modeling

Grady Bullington, Associate Professor, Ph.D. (1999) University of Tennessee - Knoxville
Research Interest: Commutative Algebra

Christopher Edwards, Associate Professor, Ph.D. (1991) Montana State University
Research Interest: Sports Statistics, Discrete Math Topics

Linda Eroh, Associate Professor, Ph.D. (2000) Western Michigan University
Research Interest: Graph Theory, Ramsey Theory

Jayanthi Ganapathy, Professor, Ph.D. (1983) Purdue University
Research Interest: Classical Harmonic Analysis, Infinite Series, Set Theory, Functional Analysis, Real and Complex Analysis

K.L.D. Gunawardena, Associate Professor and Chair, Ph.D. (1988) Michigan State University
Research Interest: Decision Theory, Empirical Bayes Theory, Statistical Quality Control, Statistics Education

Joan Hart, Professor, Ph.D. (1996) University of Wisconsin Madison
Research Interests: set theory and its applications to general topology, measure theory, and functional analysis; also automated reasoning and its applications to algebra.

Syed Kamran Kazmi, Assistant Professor, Ph.D. (2008) University of Iowa
Research Interests: Numerical Analysis, Numerical Methods for, Variational Inequalities, Finite Element Methods, Biomedical Imaging, Computational Finance.

John Koker, Professor and Dean COLS, Ph.D. (1990) University of Wisconsin Milwaukee
Research Interest: Algebra, Graph Theory

Eric Kuennen, Associate Professor, Ph.D. (2001) Michigan State University
Research Interest: Mathematics Education, Mathematical Modeling, Applied Dynamical Systems

Hosien S. Moghadam, Professor, Ph.D. (1983) University of California, Riverside
Research Interest: Combinatorics

Saadat Moussavi, Professor, Ph.D. (1984) University of California, Riverside
Research Interest: Numerical Linear Algebra, Chaos and Fractals

Kandasamy Muthuvel, Professor, Ph.D. (1985) University of Wisconsin Milwaukee
Research Interest: Real Analysis, Set Theory, Set-theoretic Topology, Group Theory

Amy Parrott, Assistant Professor, Ph.D. (2009) University of Nebraska-Lincoln
Research Interests: Mathematics Education, Mathematical Ecology

David Penniston, Associate Professor, Ph.D. (1995) University of Georgia
Research Interests: Number Theory, Arithmetic Geometry.

Kenneth Price, Associate Professor, Ph.D. (1997) University of Wisconsin Milwaukee
Research Interest: Lie Color Algebras, Ring Theory

Jennifer Szydlik, Professor, Ph.D. (1995) University of Wisconsin Madison
Research Interest: Mathematics Education

Stephen Szydlik, Associate Professor, Ph.D. (1996) University of Wisconsin Madison
Research Interest: Arrangements of Hyperplanes

Steven Winters, Professor, Ph.D. (1993) Western Michigan University
Research Interest: Graph Theory

Hong Zhang, Associate Professor, Ph.D. (1996) University of Georgia
Research Interest: Stochastic Differential Equations

Academic Staff

Ju Youn Bae, Lecturer, Ph.D. (2009) University of Wisconsin Milwaukee

Jeannette Boudry, Lecturer, M.S. (1985) Michigan State University

Michelle Campbell, Lecturer, M.S. (2010) University of Wisconsin Oshkosh

Jennifer Childress, Associate Lecturer, M.S. (2011) University of Wisconsin Oshkosh

Edward Clemons, Developmental Mathematics Coordinator, M.S. (2000) University of Wisconsin Oshkosh

Scott Dennison, Lecturer, M.A. (1969) University of Illinois at Urbana Champaign

Francisca Fernandez, Lecturer, M.S. (2005) University of Wisconsin Oshkosh

Karen Klemm, Lecturer, M.S. (1997) University of Wisconsin Oshkosh

Linda Krueger, Lecturer, M.S. (1994) Baylor University

Miriam Lamb, Lecturer, Ph.D. (1981) University of Oregon

Alexander Lavrentiev, Lecturer, Ph.D. (2004) University of Connecticut

Jae Lee, Lecturer, Ph.D. (2008) University of Wisconsin Milwaukee

Rohinidevi Muthuvel, Senior Lecturer, M.S. (1983) Marquette University

Jeremy Parrott, Lecturer, M.S. (2004) California State University - Long Beach

Charles Reigel, Lecturer, M.S. (1968) University of Notre Dame

Paul Schraufnagel , Lecturer, M.S. (2009) University of Wisconsin Oshkosh

Mike Skowronski, Lecturer, M.S. (2003) University of Wisconsin Oshkosh

Nathan Tauber, Lecturer, M.S. (2009) University of Wisconsin Oshkosh

Administrative Staff

K.L.D. Gunawardena, Chair and Associate Professor
Office(s): Swart 115 B & 205

Courtney Maron, University Services Associate II
Office(s): Swart 115 C

Ann Trabbold , University Services Associate II
Office(s): Swart 115

Advising

All mathematics majors are assigned an advisor from the mathematics faculty. The list of advisors and advisees is available on the bulletin board by the Mathematics Department Office, Swart 115. If math majors wish to choose their own advisor or to change advisors, they need to contact the chairperson of the department. A student's advisor can be contacted throughout the semester. It is required that every math major contact his/her assigned advisor prior to scheduling for all semesters after the first semester. At this meeting, the advisor and advisee will discuss the student's class schedule and future plans in the major. Mathematics minors are not assigned specific advisors. However, the chairperson is available to all minors for any questions.

Students may also use the services of Academic Advisement in Dempsey 130. In addition to providing advice on general academic matters, this office has the responsibility for administering university policies on the following:

Admissions to Professional Sequences
Late Course Withdrawals
Requests to Exceed Maximum Loads
Probation and Suspension
Waiver of Requirements
Withdrawal from the University

2011-2012 Mathematics Advisors

Applied Mathematics

Zoubir Benzaid
Jayanthi Ganapathy
Syed Kazmi
Hosien Moghadam
Saadat Moussavi
Hong Zhang

Liberal Arts

Grady Bullington
Linda Eroh
Jayanthi Ganapathy
Joan Hart
Kandasamy Muthuvel
David Penniston
Steve Szydlik
Steve Winters

Secondary Education

John Beam
Jason Belnap
Eric Kuennen
Amy Parrott
Kenneth Price
Jennifer Szydlik
Steve Szydlik

Statistics

Chris Edwards
K.L.D. Gunawardena

Elementary Education

Jennifer Szydlik

Master of Science in Mathematics Education

Jennifer Szydlik

Mathematics Minor

K.L.D. Gunawardena

Math/Stats Club

The Math/Stats Club is a student organization which sponsors both scholastic and social activities for students interested in mathematics. The organization provides an excellent opportunity for students to get better acquainted with other students and faculty members. Every year the Math/Stats Club tries to fund at least one trip to a Mathematics Conference. In the past, the Pi Mu Epsilon Conference at St. Norbert's College in DePere and The Annual Meeting of the Wisconsin Mathematics Council in Green Lake have been popular. These conferences often invite students from various universities to speak on topics of their choice, or just simply attend.

The Math/Stats Club's favorite events include movie nights and Math Awareness Week. Each gives students and faculty a chance to get to know each other outside of the university setting. Math Awareness Week is a national event held in April.

One of the main purposes of the club is to prepare members for careers in math related fields. Whether the member needs help identifying a profession that suits his/her skills and aspirations, has a career picked out and wishes to learn anything possible about that path, or anything in between, the Math/Stats club will do its best to facilitate the students along this process. We regularly bring in speakers from different math careers so members can learn about professional opportunities available and network with these professionals in various fields.

The club tries to fully fund each event. Each year members meet to think of new and creative ideas for fundraising. In the past, we have received donated textbooks which the club allows students to check out. The club's office also accepts monetary donations. Membership dues are determined by membership in national organizations.

The Math/Stats Club is also an avenue of employment for undergraduates in mathematics. Members in the Club are often hired by the department as tutors in the Math Tutor Lab. This is a great chance for students to get to know more about the courses the Math Department offers and the people who teach those classes. The tutor lab is also a meeting place. Students stop in to study, alone or in groups, or to chat and relax. Math/Stats Club members are often approached to be private tutors. The tutor and the tutee, independently set up meeting time and appropriate pay rates.

Another great advantage to being a Math/Stats Club member is their office is located in Swart 119. There is a study area, a refrigerator, and a coffee pot for student use. This provides a very quiet and secure place for math pursuits. It includes a library of math reference texts, movies and other reference materials related to math including actuarial and GRE preparation guides. The department has also supplied the Math/Stats Club office with a computer with internet access for member use.

Watch for notices of Math/Stats Club meetings and for information visit:
www.uwosh.edu/mathematics/mathstatsclub.php

Career Information

Mathematicians are found in a variety of areas. They are found in well-known companies such as IBM, AT&T Bell Laboratories, and American Airlines; in government agencies such as the Bureau of Census, the Department of Agriculture and NASA Goddard Space Center; in the arts as sculptors, musicians, and in television; in the professions of law and medicine; and in education – elementary, secondary, college and university. Degrees for mathematicians range from a bachelors to Ph.D.

A good source for employment information is the Bureau of Labor Statistics' **Occupational Outlook Handbook**. This can be found at www.bls.gov/oco

Also we encourage you to visit UW Oshkosh Career Services in Dempsey 230.

Because of the diversity of the type of work mathematicians do and their employers, the range of compensation is extremely broad.

According to the U.S. Department of Labor Bureau of Labor Statistics, median annual earnings of mathematicians is about \$86,930. The middle 50 percent earned between \$62,970 and \$106,250. The lowest 10 percent had earnings of less than \$43,500, while the highest 10 percent earned more than \$132,190.

In 2007, the average annual salary for mathematicians employed by the Federal Government in supervisory, nonsupervisory, and managerial positions was \$93,539; for mathematical statisticians, \$96,121; and for cryptanalysts, the average was \$90,435.

Academic Employment

According to Department of Labor, employment of school teachers is expected to grow by 12 percent between 2006 and 2016, about as fast as the average for all occupations. However, because of the size of the occupations in this group, this growth will create 479,000 additional teacher positions, more than all but a few occupations.

University and college teaching have always attracted many mathematicians. In most four-year colleges and universities, the Ph. D. is necessary for full time faculty status. However, those with master's degrees are also hired to teach at the college level.

Nonacademic Employment

A wide variety of nonacademic careers are found in industry and government. Computer science and the sciences such as astronomy, biology, chemistry, and physics, rely heavily on mathematics. With recent advances, each of these disciplines is increasingly using mathematical models. Mathematics is the foundation for actuarial science and is being utilized more in the social sciences, especially economics and psychology. Opportunities are also available in electrical or mechanical engineering and operations research.

Bachelor's Degree Opportunities

The main areas of nonacademic employment are Accounting and Finance, Computer Programming, Sales and marketing, Management and Related Positions, Actuarial, Computer Systems Analysis, Engineering, Statistics, and Mathematics or Modeling. Nonacademic occupations are also found in other areas of science, computer science, health, social services and other technical areas.

The AMS, MAA, and SIAM Mathematical Sciences Career Information web page provides profiles of individuals who have pursued a variety of careers in nonacademic environments. Here are some examples of what is found on the AMS website. For more detailed information, visit www.ams.org/careers

Here are some examples of the AMS website.

Accounting & Finance

Cost Estimator, Naval Sea Systems Command, Crystal City, VA, prepares cost estimates for Navy shipbuilding construction and develops the rates for labor and overhead used to derive the total cost of construction.

Partner, Gordian Group, L.P., New York, NY, works with troubled companies by helping them develop and implement financial plans that allow them to continue in business.

Research Assistant, Board of Governors of the Federal Reserve System, Washington, DC, is on the front lines of the monetary policy; works to attract new graduates who intend to move on to graduate school or Wall Street in two to three years.

Management & Related Positions

Consultant, Price Waterhouse, Bethesda, MD, constantly works with large amounts of data and performs analysis in the Management Analytic Division.

Actuarial

Investment Actuary, Westfield Companies, Westfield, OH, oversees the company's asset/liability management processes.

Actuary, American Equity Insurance Company, Scottsdale, AZ, assembles and analyzes statistics to calculate probabilities and, thus set rates, for the company.

Consulting Actuary, Muetterties, Bennett and Associates – Consultants in Casualty, Mountain Lakes, NJ, spends time on traditional actuarial tasks and many no-actuarial tasks such as marketing and maintaining the company Web pages.

Assistant Actuary, CIGNA Corporation, Philadelphia, PA, provides support to business people in a non-technical environment; that is, communicates technical information to other employees and customers in a way they can understand.

Computer Systems Analysis

Computer Specialist, Department of the Army, Rock Island, IL, uses problem-solving skills as part of a team of UNIX systems administrators.

Mathematics or Modeling

Air Pollution Meteorologist, Texas Natural Resources Conservation Commission, Austin, TX, works on projects to incorporate data from a new weather satellite earth station into models used to forecast atmospheric conditions.

Master's Degree Opportunities

Following are some examples of jobs acquired by people with master's degrees in mathematics. For more information see www.ams.org/careers.

Statistics

Project Scientist, Silas Mason Company, Inc, Amarillo, TX, performs statistical analysis and administrative support for programs providing safeguards for the assembly and dismantling of nuclear weapons.

Statistician, National Cancer Institute, Frederick Cancer Research and Development Center, Frederick, MD, works in support of both basic and applied research in biology and medicine and currently working on a project developing models of interactions between macromolecules.

Systems Analyst, Ford Motor Company, Ypsilanti, MI, collect data and performs analysis that will result in the improvement of the production processes of the Electrical and Fuel Handling Division of the plant.

Mathematics or Modeling

Vice President, D.E. Shaw & Co., New York, NY, develops new trading models that are part of the automated trading strategies used by the company.

Mathematician, National Institutes of Health (NIH), Bethesda, MD, collaborates with scientists to develop models of biological phenomena, such as a recently developed model looking at an aspect of kidney function.

Computer Programming

Senior Scientific Analyst/Programmer, SmithKline Beecham Pharmaceuticals, Swedeland, PA, applies mathematics and computation to various problems in pharmaceutical research with much effort in support of the analysis of human genome data.

Management and Related Positions

Senior Technical Specialist, Northrop Grumman, Pico Rivera, CA, leads a group of engineers and scientists on the design and analysis of systems produced by the company.

Systems Engineering Manager, Sun Microsystems, Boston, MA, manages a staff of systems engineers that provide technical support for systems sold to the Federal Government; this often mean reworking mathematical algorithms to optimize code run times.

Media Specialist, DeMasi Middle School, Marlton, NJ, helps support the curriculum, provides resources and instruction in informing processing skills, and solves problems associated with managing the media center.

Sales and Marketing

Associate Director of Clinical Research, Institute for Spine and Biomedical Research, Plano, TX, collaborates with medical personnel in area hospitals, as well as companies, to develop new health care products.

Doctoral Degree Opportunities

The AMS, MAA, and SIAM Mathematical Sciences Career Information web page provides a list of doctoral degree holders and a specific description of their occupation. Below is a list of these professions. For detailed information on any of the following job descriptions, visit www.ams.org/careers

Research or Mathematical Modeling

Chief Scientist, PRC Inc., a Subsidiary of Litton Industries, McLean, VA, leads research and development efforts in the areas of computational linguistics, information science, and artificial intelligence.

Research Staff Member, Institute for Defense Analyses, Princeton, NJ, works in the are of cryptography, the writing and deciphering codes, and signals processing.

Senior Research Scientist and Applied Math Technical Group Leader, Battelle Pacific Northwest National Laboratory, Richland, WA, does probabilistic modeling for waste tank safety analysis and develops numerical wavelet methods for computational chemistry.

Vice President, Ecodynamics Research Associates, Inc., Albuquerque, NM, works on Air Force project producing computer models and simulations to help address the environmental clean-up of sites around the world contaminated with spilled jet fuel.

Statistician, Lockheed Martin Energy Systems, Oak Ridge, TN, provides statistical support for environmental restoration projects at Department of Energy sites where nuclear material is stored.

Engineering

Research/Software Design Engineer, Microsoft Corporation, Redmond, WA, works on software development projects.

Engineering Specialist, The Aerospace Corporation, Herndon, VA, works on the development of numerical methods for space vehicle trajectory simulation tools.

Financial Engineer, Summit Systems Inc., New York, NY, develops and implements an office risk-management system used primarily by investment banks.

Management and Related Positions

Manager, System Requirements Analysis, Lockheed Martin Tactical Aircraft Systems, Fort Worth, TX, oversees people who perform modeling and analysis to evaluate competing fighter aircraft designs.

Chief Operating officer, Petrochemical Open Software Corporation, Houston, TX, leads the development of technical computing and data standards for the oil industry.

Other Sources of Information

American Mathematical Society:	http://www.ams.org/
American Statistical Association:	http://www.amstat.org/
Association for Women in Mathematics:	http://www.math.neu.edu/awm/
Mathematical Association of America	http://www.maa.org/
National Council of Teachers of Mathematics	http://www.nctm.org/
Society for Industrial and Applied Mathematics	http://www.siam.org/

The Programs

The Department's major and minors are described in the next several pages. Time-line grids given are suggestions. Actual completion of courses may vary by student. This is not an official University Curriculum document. Please consult the University Undergraduate Bulletin or the Mathematics Department for complete, accurate and up-to-date information.

Core Courses

Math 171 Calculus I (4 cr)
Math 172 Calculus II (4 cr)
Math 222 Introduction to Abstract Mathematics (3 cr)
Math 256 Introduction to Linear Mathematics (3 cr)
Math 273 Calculus III (4 cr)

The Mathematics core courses can be completed in a two-year period. Math 171 and Math 172 must be completed first. The other 3 courses can be taken in any order.

Prerequisites

Most mathematics courses have other mathematics courses as prerequisites. Prerequisite courses must be completed with a grade of "C" or better. The mathematics major can be completed in 4 years, but one needs to pay attention to prerequisites. Consult with your advisor or the University Undergraduate Bulletin for a complete list of prerequisites.

Note that a 5th year is required in the Secondary Education emphasis by the College of Education and Human Services for certification.

Mathematics Major Applied Mathematics Emphasis

Many of the jobs currently available in science, industry and government involve considerable use of mathematics. In these jobs, applied mathematicians solve a variety of problems from engineering to social research. To prepare students, who are interested in meeting these challenges, the Mathematics Department offers an emphasis in applied mathematics.

Students with a strong background in mathematics and an interest in problem solving are encouraged to consider pursuing an emphasis in applied mathematics.

The applied mathematics emphasis involves a minimum of 40 credits. Required courses include 5 core courses and 4 emphasis courses. The core courses are Calculus I, Calculus II, Calculus III, Introduction to Abstract Mathematics, and Introduction to Linear Mathematics. Required emphasis courses are Introduction to Probability and Statistics, Differential Equations, Introduction to Real Analysis and Math Modeling. One course in computer science is also required, and several others are recommended as electives.

The role of the applied mathematician in business and industry is to provide problem solving skills such as mathematical programming, statistical consulting, and/or models for researchers and managers within the company. Thus the applied major must not only know how to "set up equations" to solve a real world problem, but must also be able to "solve" these equations. Solving these equations will usually mean using existing software or writing your own.

“Setting up the equations” means that the mathematician must be familiar with areas outside of mathematics, thus a second major or supporting minor are complimentary to an applied mathematics major. An inter-disciplinary minor in Operations Research is offered jointly by the Mathematics Department and the College of Business Administration. This minor prepares students to analyze and solve organizational problems such as scheduling, transportation, inventory control and decision-making. The Mathematics Department also offers a minor in statistics which can be tailored to meet an applied math major’s need. For more information on the Operations Research or Statistics minor, see the Mathematics Minors section in the handbook. Other available minors that relate particularly well to applied mathematics include computer science, business, and the physical sciences.

Below is the suggest 4 year course layout for the **Applied Mathematics Emphasis** (40 credit minimum).

Year	Core Courses	Required Courses	Electives
Freshman	Math 171 (4 cr) Math 172 (4 cr)	Computer Sci. 221 (3 cr) This course is required for the emphasis but does NOT count toward 40-credit minimum.	
Sophomore	Math 222 (3 cr) Math 256 (3 cr) Math 273 (4 cr)	Math 301 (3 cr)	
Junior		Math 371 (3 cr)	Math 352 (3 cr) Math 355 (3 cr) Math 356 (3 cr)
Senior		Math 365 (2 cr) Math 467 (3 cr)	Math 375 (3 cr) Math 376 (3 cr) Math 381 (3 cr) Math 401 (3 cr) Math 402 (3 cr)

NOTE: The core and required courses total 29 credits, thus to complete this emphasis 11 more credits are required in elective courses.

Mathematics Major Statistics Emphasis

Some fields in which statistical methods have extensive applications are Actuarial Science, Agriculture, Biology, Business, Economics, Engineering, Fish and Wildlife Management, Health and Medicine, Psychology, Quality Control, and Sociology. In all of these areas, and many others, statisticians work closely with other scientists and researchers to develop new statistical techniques, adapt existing techniques to new situations, design experiments, and direct the analysis of surveys and retrospective studies. Statisticians are expanding their role in the development of computer software systems and in the equally important evaluation of performance of a computer system.

The Statistics emphasis involves a minimum of 39 credits. Required courses in the Statistics emphasis include 5 core courses and 4 emphasis courses. The core courses are Calculus I, Calculus II, Calculus III, Introduction to Abstract Mathematics, and Introduction to Linear Mathematics. Required emphasis courses are Introduction to Probability and Statistics, Applied Regression Analysis, Mathematical Statistics I, and Math Modeling.

The actuary field is a popular career option for someone interested statistics, finance and business. This field provides opportunities for students interested in combining mathematics with business and computer science. Professional qualification as an actuary is attained by passing a series of examinations administered by the Society of Actuaries. There is a substantial demand for actuaries. Students can greatly enhance their chances of obtaining an initial position in this field by taking the first two or three exams while they are still undergraduates. The rest are usually taken after obtaining a job. Preparation for the first two exams can be obtained from the course offerings of the UW Oshkosh Mathematics Department. For further career information, see the Career Information section of this handbook.

Below is the suggested 4 year course layout for the emphasis in **Statistics (39 credit minimum)**.

Year	Core Courses	Required Courses	Electives
Freshman	Math 171 (4 cr) Math 172 (4 cr)		
Sophomore	Math 222 (3 cr) Math 256 (3 cr) Math 273 (4 cr)	Math 301 (3 cr)	
Junior & Senior		Math 365 (2 cr) Math 385 (3 cr) Math 401 (3 cr)	Math 302 (4 cr) Math 304 (3 cr) Math 305 (3 cr) Math 355 (3 cr) Math 365 (3 cr) Math 381 (3 cr) Math 386 (3cr) Math 402 (3 cr)

NOTE: The core and required courses total 29 credits, thus to complete this emphasis 10 more credits are required in elective courses.

Mathematics Major Secondary Education Emphasis

This five-year program combines studies in mathematics with a program of studies in education and leads to Wisconsin Certification to teach mathematics in secondary schools (grades 7-12).

The Mathematics faculty believes a teacher of mathematics must have a strong knowledge of mathematics and the ability to communicate the subject effectively. Our program reflects that philosophy.

Mathematics is a critical facet of modern society. Thus the transmission of mathematics to young people is particularly important to both the personal development of these individuals and for the progress of this nation. The program outlined here is specifically designed to meet and exceed the needs of pre-service (those preparing to teach) and in-service (those currently teaching) mathematics teachers. It reflects the most current guidelines and standards of professional societies such as the Mathematical Association of America (MAA) and the National Council of Teachers of Mathematics (NCTM). It is sensitive to the changing needs of the modern professional teacher.

Required courses in the secondary education program include a blend of traditional subjects such as calculus, discrete mathematics, linear mathematics, algebra, geometry, probability and statistics, with other courses in mathematical reasoning and proof, problem solving and strategies, and mathematical modeling. Because of the current information explosion and its reliance on computer and calculator technology, it is absolutely essential that those preparing to teach mathematics have a working knowledge of computers and graphic programmable calculators, and familiarity with the evaluation and usage of software for computer- assisted instruction. The core of this program consists of Calculus I, II, and III, Introduction to Abstract Mathematics, Introduction to Linear Mathematics, Introduction to Probability and Statistics, and the Seminar in Problem Solving. Additional upper level course work is taken in the fields of algebra, geometry, probability/statistics, and other electives. Adjunct curricular packages in statistics, computing mathematics, and graduate preparatory work are also available within the department. A total of 39 credits in mathematics (beginning with Calculus I) is required for the major. Most teaching majors take about 40 credits.

Students who have had four years of high school mathematics with good grades and disciplined study habits are encouraged to consider the teaching of mathematics as a career. The mathematics faculty seeks highly motivated individuals who are willing to work to achieve their goals. **Every participant in this program is assigned a faculty advisor who is a full-time mathematics department member familiar with the program and the professional field.** Students are encouraged to work closely with their advisors and to meet with them for counseling about schedule, courses, difficulties and general concerns.

The secondary education mathematics program is part of a professional education program which generally requires five years of work. Students complete a mathematics major as described in the first four years. Professional education courses begin in the sophomore year and extend through the fifth year. After successful completion of the first four years, the prospective teacher graduates with a B.S. degree in mathematics. Certification to teach is not granted until successful completion of student teaching, which is taken the fifth year. During the senior year, the student makes application for Admission II. This requires a baccalaureate degree, or at least a 3.00 grade point average (on a 4 point scale) for all course work, including a 3.00 GPA in the major, the minor, and all professional education courses. Admission II also requires a positive recommendation of the clinical professional

supervisor and a clear health examination. Once these requirements are met, the student is admitted to the fifth year program. In that year student teaching is completed and 15 graduate credits are also taken, and the 3.00 GPA must be maintained. Upon successful completion of the student teaching experience and passing a State of Wisconsin Department of Public Instruction standardized exam in each certification major and minor, the student is certified to teach secondary mathematics in the State of Wisconsin.

The department also offers minors in both Mathematics for Secondary Education Licensure and Mathematics for Elementary and Middle School Licensure. A total of 25 credits are required for Secondary Education Licensure and 24 credits for Elementary and Middle School Licensure. For more information of these minors, see the Mathematics Minors section in this handbook.

Below is the suggested 4 year course layout for the emphasis in **Secondary Education**.

Year	Core Courses	Required	Electives
Freshman	Math 171 (4 cr) Math 172 (4 cr)		
Sophomore	Math 222 (3 cr) Math 256 (3 cr) Math 273 (4 cr)	Math 301 (3 cr)	
Junior		<p style="text-align: center;">Algebra</p> <p>one course from:</p> <p>Math 346 (3 cr)</p> <p>Math 347(3 cr)</p> <p>Math 348(3 cr)</p> <p>Math 349 (3 cr)</p> <p style="text-align: center;">Geometry</p> <p>Math 331 (2 cr)</p> <p>and one course from:</p> <p>Math 333 (2 cr)</p> <p>Math 334 (2 cr)</p>	<p>At least 9 credits (not already taken) with at least 2 courses from different areas:</p> <p>Algebra: Math 346, Math 347, Math 348, Math 349</p> <p>Geometry/Topology: Math 333, Math 334, Math 480</p> <p>Probability/Statistics: Math 302, Math 304, Math 381, Math 385, Math 386, Math 401, Math 402</p> <p>Computing: Math 352, Math 355, Math 356, Math 357</p>
Senior		Math 485 (2 cr)	<p>Analysis: Math 371, Math 375, Math 376, Math 467</p>

Mathematics Major Liberal Arts Emphasis

The Liberal Arts emphasis provides preparation for the student who intends to pursue graduate studies after completing a baccalaureate degree in mathematics. A graduate degree in mathematics can lead to a career in industry, government or academia. For example, University faculty, research scientists, software engineers, and computer programmers often hold advanced degrees in mathematics. In addition, the Liberal Arts mathematics major provides a good foundation for graduate study in related fields such as computer science, physics, chemistry, and law.

The Liberal Arts student needs to begin his or her major with three semesters of calculus (Calculus I, II, and III), Introduction to Linear Mathematics, Introduction to Abstract Mathematics, and a seminar in math modeling or problem solving. Mathematics graduate programs will generally expect students to have completed coursework in pure mathematics, specifically in the area of algebra and analysis. Therefore, in addition to the core, the Liberal Arts emphasis requires that two courses in the general area of algebra (Abstract Algebra I, Linear Algebra, or Elementary Number Theory) and two courses in the general area of analysis (Vector & Complex Analyses, Partial Differential Equations and Boundary Value Problems, Advanced Calculus, or Topology) be completed. Electives can be selected from a wide variety of courses.

Below is the suggested 4 year course layout for the emphasis in **Liberal Arts**.

Year	Core Courses	Required	Electives
Freshman	Math 171 (4 cr) Math 172 (4 cr)		
Sophomore	Math 222 (3 cr) Math 256 (3 cr) Math 273 (4 cr)		
Junior		1. 2 courses from: Math 301 (3 cr), Math 346 (3 cr), Math 347(3 cr), Math 348(3 cr), Math 349 (3 cr)	At least 1 course (not already taken) from: Geometry/Topology: Math 331, Math 333, Math 334, Math 490 Probability/Statistics: Math 302, Math 304, Math 305, Math 381, Math 385, Math 386, Math 401, Math 402
Senior		2. 2 courses from: Math 375 (3 cr), Math 376 (3 cr) Math 467 (3 cr), Math 480(3 cr) 3. Math 365 (2 cr) or Math 485 (2 cr)	Computing: Math 352, Math 355, Math 356, Math 357 Analysis: Math 371, Math 375, Math 376, Math 467

Mathematics Minors
Minor for Letters and Science or Business Students

The minor for Letters & Science or Business students is a general mathematics minor recommended for students who are majoring in fields such as Business, Computer Science, Economics, Natural Sciences, Physical Sciences.

Required Credits: 25

Required Courses

Math 171 (4 cr)
Math 172 (4 cr)
Math 273 (4 cr)
Math 222 (3 cr)
Math 256 (3 cr)
Math 301 (3 cr)

Electives

Approved courses to meet
25 credit minimum.

Operations Research Minor

The Operations Research mathematics minor often attracts Business majors, especially those in Management Information Systems (MIS). This minor is also recommended for majors in Computer Science, Physical Sciences, or similar fields.

Required Credits: 26

Required Courses

Math 171 (4 cr)
Math 172 (4 cr)
Math 222 (3 cr)
Math 256 (3 cr)
Math 301 (3 cr)

Electives

Approved courses to meet
26 credit minimum.

One course from: Business 341, Business 342, Business 441, or Business 449.

Minor for Secondary Education Licensure

The minor for Secondary Education Licensure is recommended for students who have had 4 years of high school mathematics, are earning a degree in Secondary Education, and are planning to teach mathematics or a related field.

Required Credits: 25

Required Courses:

Math 171 (4 cr)
Math 172 (4 cr)
Math 222 (3 cr)
Math 256 (3 cr)
Math 201 (3 cr) **or** Math 301 (3 cr)
Math 331 (2 cr)
Math 334 (2 cr)

Electives

One additional course in Algebra, Geometry, Probability/Statistics or Computing Mathematics

Approved Courses to meet 25 credit minimum.

For further information on licensure requirements for Secondary Education students, see College of Education and Human Services section in the University of Wisconsin Oshkosh Undergraduate Bulletin.

Minor for Elementary and Middle School Licensure

The minor for Elementary Education Licensure is recommended for students who have had 4 years of high school mathematics, are earning a degree in Elementary Education, and are interested in teaching Elementary or Middle School Mathematics (Certification Pk-3, Pk-6, 1-8, 5-9).

Required Credits: 24

Required Courses

Math 110 (3 cr)
Math 211 (3 cr)
Math 217 (3 cr)
Math 490 (3 cr)

Electives

Approved courses to meet 24 credit minimum.

3 courses from: Math 317, Math 319, Math 413 and Math 415

The prerequisites for Math 110, Number Systems, is initial math placement above the remedial level or a C or better in Math 100. Thus, Math 100 may also need to be taken the first year. The prerequisite for Math 211 and for Math 217 is Math 110 with a grade of C or better. Math 317, Math 319, Math 413, and Math 415 all require Math 104, College Algebra, as a prerequisite (in addition to the prerequisites Math 211 and Math 217). Math 490, Senior Seminar for Elementary and Middle School Programs, require that each student enrolled be of senior status with major in elementary education and have completed 17 credits towards a minor in math.

Statistics Minor

Most students completing the Statistics minor are math majors in an emphasis other than Statistics or Computer Science majors. This minor is also recommended for students who are in the areas of Business, Education, Natural Science, Physical Science and Social Science.

Required Credits: 27

Required Courses

Math 171 (4 cr)
Math 172 (4 cr)
Math 222 (3 cr)
Math 201 (3 cr) **or** Math 301 (3 cr)
Math 302 (4 cr)

Electives

Approved courses to meet
27 credit minimum.

At least 2 courses from: Math 304, Math 305, Math 381, Math 385, Math 386

Master of Science in Mathematics Education

The Master of Science in Mathematics Education is a program designed for the professional mathematics educator. The primary objective of this program is to provide a mathematics graduate program with high standards dedicated to the promotion of teaching effectiveness. The program is designed to give secondary and post secondary mathematics teachers breadth and depth in mathematics, statistics and computing mathematics. A secondary objective is to provide curricula in the mathematical sciences which meet the present and future needs of all students who want advanced study. Graduate courses for this program are available in the evenings and during summer sessions.

Admission in full standing to this degree program requires that the applicant meet the following minimum requirements.

Baccalaureate degree from a regionally accredited institution.

Undergraduate grade point average of at least 2.75 (4.00) scale or an average of at least 2.90 during the last half (approximately 60 credits) of undergraduate work.

In addition to the general requirements, applicants must have taken 30 credits in mathematics with a minimum grade point average of 2.75. Mathematics courses should include 2 semester of calculus, 2 semesters of modern algebra (abstract and linear recommended), 1 semester of modern geometry, and 1 semester of probability and statistics. Probationary or conditional admissions may be considered based upon individual merit.

A minimum of 30 approved graduate credits, which must be at least 18 upper-level (700) credits, are required for the degree. Also required are at least 18 credits in mathematics with courses in 2 or more of the following areas: algebra, combinatorics, and geometry; and 3 credits in mathematics curriculum. The remaining credits are electives and may be taken in any combination of courses in mathematics, computer science, or education. A thesis is optional but a comprehensive examination is required.

For more information contact:

Jennifer Szydlik
Graduate Coordinator
Mathematics Department
University of Wisconsin Oshkosh
Oshkosh, WI 54901-8631
(920) 424-7350
szydlik@uwosh.edu

Financial Assistance

The Mathematics Department offers job opportunities to qualified math students. The following types of finance assistance are available.

- ***Student Assistantships***

The Mathematics Department hires several students to tutor students in lower level mathematics courses or assist with office work. Interested students should apply in person at the department office, Swart 115.

- ***Graduate Assistantship***

A limited number of graduate assistantships are offered to qualified graduate students. Contact Jennifer Szydlak for details.

- ***Work Study Programs***

A number of students are assigned to the Mathematics Department under this program. These students are assigned to the same jobs as student assistants. Interested students should apply in person at the department office, Swart 115.

Scholarships and Awards

The Mathematics Department gives an excess of \$2500.00 away each year to qualified mathematics students. These awards are presented in honor of three mathematics faculty members from the University of Wisconsin Oshkosh, Radford Boeing, Harvey McKenzie, Robert W. Prielipp, and Robert J. Wonders.

In the past, the department has given a sophomore scholarship and two senior awards. The sophomore recipient had completed Calculus I and II with either an A and a B or two A's and had received the highest score (above 50%) on an examination covering these two courses. The senior award recipients were selected by the department faculty from those mathematics majors with overall grade point average above 3.50.

The Math Department honors award recipients with a certificate at an informal social. Each winner also receives a certificate of recognition from the university and a check presented at the University Awards Ceremony in May. The department also reimburses math majors for the cost of actuarial exams that have been passed.

Entering freshman enrolled as full-time undergraduate students at UW Oshkosh and taking a mathematics course at or above the level of Calculus are eligible to win the American High School Mathematics Examination (AHSME) Prize Scholarship. The recipient must be among the top scorers in Wisconsin on the AHSME or the Mathematical Association of America Section Exam. For more information on this scholarship contact K.L.D. Gunawardena at the math department.

To obtain information about other types of financial assistance, contact the Financial Aids Office in Dempsey.

MATHEMATICS FACULTY AND STAFF 2011-2012

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