

MATHEMATICS AND COMPUTER SCIENCE

DEPARTMENT OFFICE

1001 New Science Facility

Phone: 906-227-2020

Fax: 906-227-2010

Web Page: math.nmu.edu

Department Head: G. Jailan Zalmai • gzalmai@nmu.edu



Mathematics and Computer Science at NMU

The primary mission of the Mathematics and Computer Science Department is to prepare students for participation in professional careers in mathematics, mathematics education, and computer science, while providing service and liberal studies courses for the broader university community. In addition, the department contributes to the continuing education of K-12 teachers in the region. The department also offers a master's degree in mathematics education.

The study of mathematics develops the critical and analytical skills needed in medicine, law or business, and supports majors such as physics, chemistry, biology, psychology, economics, sociology, or geography. It provides an understanding of the contributions of mathematics to philosophy, the arts, science and technology, and provides an exciting intellectual experience.

Computer science is the study of what is possible through computation. It is also the creative exploration of how to achieve these possibilities. Computers are the ultimate machines because they can be reconfigured (programmed) in an infinite number of ways. A computer science degree provides a deep and thorough understanding of modern computers, from their theoretical limitations to the next great leap in their practical application.

Successful completion of a computer science, mathematics or mathematics education major prepares students for graduate work in mathematics or computer science and for professions in statistics, applied mathematics, computer science and teaching.

Student Organizations

- Mathematics and Computer Science Club
- Student Chapter of the Association for Computing Machinery
- Student Michigan Education Association

Department/Program Policies

To ensure student success, the department does not allow students to enroll in the same course more than two times. If a student must take a course for the third time, he or she must

first take the prerequisite course(s) and obtain a grade of "B-" or better in each.

All non-teaching majors and minors offered by the department require a 2.00 or higher overall grade point average in required courses and a grade of "C" or better in each required course. All students must pass prerequisite courses with a grade of "C-" or higher unless otherwise indicated.

Students majoring in secondary education mathematics or minoring in secondary education mathematics must maintain a grade point average of 2.70 or greater with no grade below a "C" in the professional education sequence, the major and/or minors and required cognates combined.

Mathematics courses with a middle digit of "5" will not count toward the requirements of a non-education major or minor. Students pursuing minors in the department are urged to consult with their advisers in determining an appropriate selection of courses.

BACHELOR DEGREE PROGRAMS

Liberal Studies: Complete information on the liberal studies requirements and additional graduation requirements, including the health promotion requirement, is in the "Liberal Studies Program and Graduation Requirements" section of this bulletin.

Courses within each major that can be used to satisfy liberal studies requirements are listed with the Roman numeral (in brackets) that coincides with the liberal studies division the course falls under.

Applied Mathematics Major

With an emphasis on the fundamental nature and function of mathematical modeling, this major combines computational techniques with computer-based problem solving in a variety of applications. Graduates of this program are provided with the foundation to either join the professional workforce or continue their studies at the graduate level. A computer science minor is built into this major.

Total Credits Required for Degree	128
Liberal Studies	30-40
Health Promotion	2
Required Courses in Major	60
Mathematics Core	35
MA 161 Calculus I [III]	5
MA 163 Calculus II	4
MA 211 Intro. to Matrix Theory and Linear Algebra	3
MA 265 Calculus III	3
MA 312 Abstract Algebra with Applications	3
MA 361 Differential Equations	3
MA 371 Applied Probability and Statistics	3
MA 380 Linear Programming	3
MA 340 Combinatorics (4 cr.) <i>or</i>	3-4
MA 410 Mathematical Modeling (3 cr.)	
MA 473 Numerical Analysis	4
MA 490 Senior Seminar	1
Computer Science Core	15
CS 120 Computer Science I [V] <i>or</i>	4
CS 120A Accelerated Computer Science I (4 cr.) [V]	
CS 122 Computer Science II	4
CS 222 Data Structures	4
CS 326 Software Design and Engineering	3
Mathematics/Computer Science Electives	10
<i>Choose from the following:</i>	
MA 340 Combinatorics (4 cr.)	
MA 381 Integer Programming and Network Flows (3 cr.)	
MA 410 Mathematical Modeling (3 cr.)	
MA 462 Higher Mathematics for the Sciences (3 cr.)	
MA 472 Advanced Applied Statistics (3 cr.)	
MA 475 Intermediate Statistics (4 cr.)	
MA 485 Stochastic Models in Operations Research (3 cr.)	

MA 491 Internship in Applied Mathematics (3-6 cr.)
CS 228 Network Programming (3 cr.)
CS 322 Principles of Programming Languages (4 cr.)
CS 422 Algorithms Design and Analysis (3 cr.)

Minor*	20
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**Computer science may be declared as the minor without further course requirement if at least five credits of the mathematics/computer science electives are in computer science.*

Computer Science Major

This major combines courses in practical programming, computer architecture, networking and algorithm design/analysis with an appropriate background in mathematics and theory of computing. Included are classes covering the latest technologies such as robotics and Internet applications. This major provides the foundation for a rewarding and productive career in industry as well as strong preparation for graduate school.

Total Credits Required for Degree	128
Liberal Studies	30-40
Health Promotion	2
Required Courses in Major	60
Computer Science Core	35
CS 120 Computer Science I [V] <i>or</i>	4
CS 120A Accelerated Computer Science I (4 cr.) [V]	
CS 122 Computer Science II	4
CS 201 Programming in C++	3
CS 222 Data Structures	4
CS 228 Network Programming	3
CS 322 Principles of Programming Languages	4
CS 326 Object Oriented Design	3
CS 330 Microcomputer Architecture	4
CS 422 Algorithms Design and Analysis	3
CS 426 Operating Systems	3
Mathematics Core	15
MA 161 Calculus I [III]	5
MA 163 Calculus II	4
MA 211 Introduction to Matrix Theory and Linear Algebra	3
MA 240 Discrete Mathematics	3
Mathematics Elective	3-4
<i>Choose from the following:</i>	
MA 171 Introduction to Probability and Statistics (4 cr.) [V]	
MA 310 Mathematical Models and Problem Solving (4 cr.)	
MA 380 Linear Programming (3 cr.)	
MA 381 Integer Programming and Network Flows (3 cr.)	
MA 410 Mathematical Modeling (3 cr.)	
MA 473 Numerical Analysis (4 cr.)	

Computer Information Systems, Computer Science and Mathematics Electives 6
 Choose from the following:
 CIS 464 Database Management Systems (3 cr.)
 CS courses numbered 300 or higher, excluding those with middle digit 5. (1-6 cr.)
 MA courses numbered 265 or higher except MA 271, MA 331, MA 484 and math courses with middle digit "5." (1-6 cr.)

Minor* 20
 *Mathematics may be declared as a minor if at least five credits of electives are in mathematics courses.

Mathematics Major

Students pursuing this degree will have the opportunity to study traditional core courses in mathematics as well as modern applied mathematics courses covering some major topics related to actuarial science and operations research.

Total Credits Required for Degree 124

Liberal Studies 30-40
Health Promotion 2

Required Courses in Major 34-35

CS 120 Computer Science I [V] or 4
 CS 120A Accelerated Computer Science I (4 cr.) [V]
 MA 161 Calculus I [III] 5
 MA 163 Calculus II 4
 MA 211 Introduction to Matrix Theory and Linear Algebra 3
 MA 265 Calculus III 3
 MA 312 Abstract Algebra with Applications 3
 MA 361 Differential Equations 3

Mathematics Electives 9-10

Choose from the following:
 MA 340 Combinatorics (4 cr.)
 MA 363 Advanced Calculus I (3 cr.)
 MA 366 General Topology (3 cr.)
 MA 371 Applied Probability and Statistics (3 cr.)
 MA 380 Linear Programming (3 cr.)
 MA 412 Abstract Algebra II (3 cr.)
 MA 464 Advanced Calculus II (3 cr.)
 MA 465 Complex Variables (3 cr.)
 MA 472 Advanced Applied Statistics (3 cr.)
 MA 473 Numerical Analysis (4 cr.)
 MA 481 Mathematical Logic (3 cr.)
 MA 482 Foundations of Mathematics (3 cr.)
 MA 483 Introduction to Number Theory (3 cr.)
 MA 484 History of Mathematical Thought (3 cr.)

Minor 20

Network Computing Major

This major is designed to offer students an education in the important world of Internet and Intranet programming. This course of study emphasizes programming skills while concentrating on the latest concepts, architecture and algorithms for network computation. Students will learn the fundamentals of computer science while focusing on aspects important to the world of network computing.

Total Credits Required for Degree 124-125

Liberal Studies 30-40
Health Promotion 2

Required Courses in Major 42-43

Network Computing Core 21
 CS 120 Computer Science I [V] or 4
 CS 120A Accelerated Computer Science I (4 cr.) [V]
 CS 122 Computer Science II 4
 CS 201 Programming in C++ 3
 CS 222 Data Structures 4
 CS 326 Object Oriented Design 3
 CS 480 Senior Project in Computer Science 3

Mathematics Requirement 3
 MA 240 Discrete Mathematics 3

Networking Requirement 3
 CS 228 Network Programming 3

Computer Science Electives 6-7
 Choose from the following:
 CS 442 Advanced Networking (3 cr.)
 CS 444 Parallel and Distributed Processing (4 cr.)
 CS 460 Advanced Web Programming (3 cr.)

Computer Science, Mathematics, Computer Information Systems and Art and Design Electives 9

Choose from the following:
 CS courses numbered 200 or higher, excluding those with a middle digit 5. (1-9 cr.)
 AD 134 Electronic Imaging: Introduction (4 cr.)
 AD 234 Electronic Imaging: Web Design (4 cr.)
 AD 334 Electronic Imaging: 3D (4 cr.)
 AD 434 Electronic Imaging: Seminar (4 cr.)
 CIS 330 Novell Network Operating Systems II (3 cr.)
 CIS 334 Microsoft Network Operating Systems II (3 cr.)
 CIS 440 Management Information Systems (3 cr.)
 CIS 464 Database Management Systems (3 cr.)

Minor 20

Other Required Course 4
 MA 171 Introduction to Probability and Statistics [V] 4

Secondary Education Mathematics Major

Completion of the mathematics courses, a teaching minor as well as the professional education sequence lead to certification as a secondary teacher of mathematics.

Total Credits Required for Degree	133-137
Liberal Studies	30-40
Health Promotion	2
Required Courses in Major	33-35
MA 161 Calculus I [III]	5
MA 163 Calculus II	4
MA 211 Introduction to Matrix Theory and Linear Algebra	3
MA 265 Calculus III	3
MA 310 Mathematical Models and Problem Solving	4
MA 312 Abstract Algebra with Applications	3
MA 331 Geometry I	3
MA 484 History of Mathematics	3
MA 171 Introduction to Probability and Statistics (4 cr.) [VI] <i>or</i> MA 371 Applied Probability and Statistics (3 cr.)	3-4
Mathematics Electives	2-3
Select from mathematics courses numbered 300 or above, excluding those with a middle digit "5."	
Other Required Course	4
CS 120 Computer Science I [VI] <i>or</i> CS 120A Accelerated Computer Science I (4 cr.) [V]	4
Teaching Minor, minimum	24
Professional Education	34
ED 201 Introduction to Education	2
ED 231 Teaching and Learning in the Secondary Classroom	4
ED 301 Dimensions of American Education	2
ED 319 Teaching of Reading for Secondary Teachers	3
ED 349 Teaching for Diversity, Equity and Social Justice in the Secondary School Community	2
MA 350 Methods and Materials in Teaching Senior High School Mathematics Education	3
MA 354 Methods and Materials in Teaching Junior High School Mathematics Education	2
ED 361 Special Education and the General Classroom Teacher	2
ED 483 Educational Media and Technology	2
ED 430 Teaching in the Secondary School	11
ED 450 Seminar in Teaching	1

MINOR PROGRAMS

Computer Science Minor

Total Credits Required for Minor **20**

This minor requires 20 credits in computer science courses numbered 120 or above; up to 8 hours of these may be mathematics courses numbered 115 or above, excluding those with a middle digit of "5."

Mathematics Minor

Total Credits Required for Minor **20**

This minor requires 20 credits in mathematics courses numbered MA 115 or above excluding those with a middle digit "5"; up to 8 hours of these may be computer science courses numbered 120 or above. This option is not available as a teaching minor.

Secondary Education Mathematics Minor

Total Credits Required for Minor **23-25**

MA 171 Introduction to Probability and Statistics (4 cr.) <i>or</i> MA 371 Applied Probability and Statistics (3 cr.)	3-4
MA 161 Calculus I	5
MA 163 Calculus II	4
MA 211 Introduction to Matrix Theory and Linear Algebra	3
MA 312 Abstract Algebra with Applications	3
MA 331 Geometry I	3
MA 350 Methods and Materials in Teaching Senior High School Mathematics Education (3 cr.) <i>or</i> MA 354 Methods and Materials in Teaching Junior High School Mathematics Education (2 cr.)	2-3