

# APPLIED MATHEMATICS, MS

**Degree:** Master of Science (MS)  
**Field of Study:** Applied Mathematics

## Program Overview

A student must satisfy all of the general requirements of the School of Graduate Studies as well as the more specific requirements of the department to earn a master's degree. Each graduate student is assigned an academic advisor upon matriculation. The academic advisor's primary responsibility is to help the student plan an appropriate and sufficiently broad program of coursework and study that will satisfy both the degree requirements and the special interests of the student. With the aid of the academic advisor, each student must present a study plan indicating how they intend to satisfy the requirements for a graduate degree. Master's students completing a thesis as part of their program will also form a thesis committee, chaired by their research advisor, to advise on and evaluate both the thesis and its oral defense.

## Graduate Policies

For graduate policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

## Program Requirements

The department offers specialized programs in applied mathematics. For each of the programs, there is a minimum requirement of 30 credit hours of coursework, at least 18 of which must be at the 400-level or higher. Students in the program must complete coursework requirements in each of the following groups:

- At least 15 credit hours of courses designated MATH
- At least 6 credit hours of courses not designated MATH
- 6 credit hours of thesis work (see below) or successful completion of a comprehensive exam

Given the great diversity of topics used in applications, there cannot be a large common core of requirements for the Master of Science in Applied Mathematics. Still, all students pursuing this degree are strongly advised to take MATH 431 and MATH 441. In addition, to add breadth to the student's education, the set of courses taken within the department must include 3 credit hours of approved coursework in at least three of the following seven breadth areas. Examples of acceptable courses in each area are listed below; other courses require approval of a student petition by the department graduate committee. Although some courses are listed in multiple areas, a course may be used to satisfy only one breadth area requirement.

### Applied Mathematics Breadth Areas:

Code	Title	Credit Hours
<b>Analysis and Linear Algebra:</b>		
MATH 405	Advanced Matrix Analysis	3
MATH 423	Introduction to Real Analysis I	3
MATH 425	Complex Analysis I	3
MATH 428	Fourier Analysis and Applications	3
<b>Probability and its Applications:</b>		

MATH 419	Applied Probability and Stochastic Processes for Biology	3
MATH 439	Bayesian Scientific Computing	3
MATH 482	High Dimensional Probability	3
<b>Numerical Analysis and Scientific Computing:</b>		
MATH 431	Introduction to Numerical Analysis I	3
MATH 432	Numerical Differential Equations	3
MATH 433	Numerical Solutions of Nonlinear Systems and Optimization	3
<b>Differential Equations:</b>		
MATH 435	Ordinary Differential Equations	3
MATH 445	Introduction to Partial Differential Equations	3
MATH 449	Dynamical Models for Biology and Medicine	3
<b>Inverse Problems and Imaging:</b>		
MATH 439	Bayesian Scientific Computing	3
MATH 440	Computational Inverse Problems	3
MATH 473	Introduction to Mathematical Image Processing and Computer Vision	3
<b>Logic and Discrete Mathematics:</b>		
MATH 406	Mathematical Logic and Model Theory	3
MATH 408	Introduction to Cryptology	3
<b>Life Science:</b>		
MATH 419	Applied Probability and Stochastic Processes for Biology	3
MATH 441	Mathematical Modeling	3
MATH 449	Dynamical Models for Biology and Medicine	3
MATH 478	Computational Neuroscience	3
<b>Code</b>	<b>Title</b>	<b>Credit Hours</b>
<b>Additional Approved Courses:</b>		
MATH 424	Introduction to Real Analysis II	3
MATH 425	Complex Analysis I	3
MATH 427	Convexity and Optimization	3
MATH 444	Mathematics of Data Mining and Pattern Recognition	3
MATH 492	Probability II	3

The student must pass a comprehensive examination on three areas, two of which must be on the list of breadth areas (although no particular courses are specified). The third area for the examination may be any approved subject.

A student in the MS program in Applied Mathematics may substitute the comprehensive examination requirement with an expository or original thesis, which will count as 6 credit hours of coursework. The thesis will be defended in the course of an oral examination, during which the student will be questioned about the thesis and related topics. These two variants correspond to the graduate school's Master's Thesis and Master's Non-Thesis options.