APPLIED AND COMPUTATIONAL MATHEMATICS

The Applied and Computational Mathematics (ACM) program provides graduate-level education in applied mathematics for people whose goal is to develop comprehension of principles of applied mathematics and skills in employing those principles in industrial or scientific settings. It has three central themes: general principles and theories of applied mathematics, the construction and analysis of mathematical models, and the development and efficient execution of computational mathematical algorithms. Effective use of advanced applied mathematical techniques has become increasingly important in industrial settings as the amount of sophisticated simulation software has mushroomed. People are needed who can help engineers, scientists and managers in the precise formulation of complex problems and in selecting the analytical methods and software appropriate for their solution. These people should understand the algorithms underlying mathematical software and be able to implement additional mathematical algorithms knowledgeably and efficiently in the framework of existing software. Finally, these people need to be able to interpret the results of computations to others. It is the goal of the program to provide people with these skills.

The Program

The key components of this evening program involve the integration of applied mathematics, mathematical modeling and numerical analysis. The ACM program provides not only coursework in various areas of applied mathematics, but also opportunities for independent or collaborative work. These approaches to learning contribute to a student's outlook and depth of understanding. The program supports the development and enhancement of students' skills useful in industrial and scientific careers, and in other careers having applied mathematics as its primary focus. It is geared toward three groups of prospective students: individuals in established careers who want or require further training for their current positions, individuals in the workforce who wish to retrain for new career directions, in some cases preparing for a more mathematically-oriented assignment with their current employer, and recent graduates who desire a deeper understanding of applied mathematics as an aid in launching a career.

Admission and Prerequisites

Admission to the ACM program as a regular student requires a BA or a BS degree in mathematics, computer and information science, engineering, a physical science or a life science earned from a program at an accredited institution with an average of *B* or better. Individuals with other degrees or less than a *B* average may be considered for conditional admission status and may be required to submit evidence of potential for success in a graduate program. An entering student should have completed three courses in Calculus, including multivariate calculus, plus introductory courses in Linear Algebra and Differential Equations. Deficiencies in prerequisites may be made up after entrance to the Graduate Program. However, credits received in courses elected to make up the deficiencies do not count toward the degree.

Application instructions can be found at: umdearborn.edu/gradapplynow (http://www.umdearborn.edu/gradapplynow/)

Each applicant should submit the following:

1. Official transcripts from all universities attended.
2. A one-page statement of purpose describing the applicant's career goals and personal objectives in pursuing the program.
3. Three letters of recommendation. At least one letter must be from an academic source.
4. Students whose native language is not English are also required to satisfy the English Language Requirements for Admission which can be found in the General Information section of this catalog.

For more information, visit the ACM website (https://umdearborn.edu/casl/graduate-programs/programs/master-science-applied-and-computational-mathematics/) or call 313-583-6321.

Advanced Standing

Graduate credit may be transferred from other accredited degree-granting universities with graduate degree programs for up to a maximum of 6 credit hours, or their equivalent. For universities on the quarter system, 9 credit hours is the equivalent of 6 semester credit hours. Graduate credit may be transferred from other University of Michigan campuses (Flint or Ann Arbor) for up to half the credits required for the degree.

Degree Requirements

30 semester hours of graduate course work with a cumulative grade point average of B or better. The 30 hours must be selected from lists of approved courses and be approved by the student's graduate advisor. At least 15 of the hours must be Mathematics and Statistics courses. Up to six credit hours toward the degree may be granted by the Graduate Program Committee to a student through the transfer of credit for approved graduate-level courses. Such courses must have been completed within the past five years with a grade of B or better at an accredited institution and not have been applied in whole or in part toward another degree or certificate.

Specific Course Requirements

Code	Title	Credit Hours
Core Courses		
Select one course from each of the following areas. At most, nine credit hours of these courses may count toward the 30 credit hours.		9
Mathematical Analysis:		
MATH 551	Advanced Calculus I	
MATH 554	Fourier and Boundary	
MATH 555	Func of a Complex Var with App	
Modeling:		
MATH 562	Mathematical Modeling	
Numerical Methods:		
MATH 572	Intro to Numerical Analysis	
or MATH 573	Matrix Computation	
Modeling Specialization Areas		
Select at least four courses from the modeling specialization areas listed below. Not all four may be from the same area.		12
Linear and Discrete Models:		
MATH 523	Linear Algebra w/Applications	
STAT 530	Applied Regression Analysis	
MATH 558	Introduction to Wavelets	
MATH 573	Matrix Computation	

Differential Models:		
MATH 504	Dynamical Systems	
MATH 514	Fin Diff Meth for Diff Equat	
MATH 516	Fin Elemnt Meth for Diff Equat	
MATH 554	Fourier and Boundary	
Statistical Models:		
MATH 520	Stochastic Processes	
MATH 525	Mathematical Statistics II	
STAT 535	Data Analysis and Modeling	
STAT 545	Reliability & Survival Analys	
STAT 530	Applied Regression Analysis	
STAT 550	Multivariate Stat Analysis	
STAT 560	Time Series Analysis	
Project or Independent Research		**3**
MATH 599	Independent Research Project	
Cognate		
Six credit hours of cognate courses outside the Department of Mathematics and Statistics are required. The courses should be selected from an approved list.		6
Total Credit Hours		30

Cognate Courses

Code	Title	Credit Hours
Computer and Information Science		
CIS 505	Algorithm Analysis and Design	3
CIS 515	Computer Graphics	3
CIS 527	Computer Networks	3
CIS 537	Advanced Networking and Distributed Systems	3
CIS 544	Computer and Network Security	3
CIS 551	Advanced Computer Graphics	3
CIS 552	Information Visualization and Virtualization	3
CIS 568	Data Mining	3
CIS 574	Compiler Design	3
CIS 575	Software Engineering Mgmt	3
CIS 652	Advanced Information Visualization and Virtualization	3
Economics		
ECON 5015	Introduction to Econometrics	3
Electrical and Computer Engineering		
ECE 552	Fuzzy Systems	3
ECE 555	Stochastic Processes	3
ECE 560	Modern Control Theory	3
ECE 565	Digital Control Systems	3
ECE 567	Nonlinear Control Systems	3
ECE 585	Pattern Recognition	3
ECE 665	Optimal Control Systems	3
Industrial and Manufacturing Systems Engineering		
IMSE 500	Models of Oper Research	3
IMSE 505	Optimization	3
IMSE 510	Probability & Statistical Mod	3
IMSE 511	Design and Analysis of Exp	3
IMSE 514	Multivariate Statistics	3
IMSE 520	Managerial Decision Analysis	3
IMSE 567	Reliability Analysis	3
Management		
DS 570	Management Science	3
OM 521	Operations Management	3
OM 660	Supply Chain Analytics	3
Mechanical Engineering		
ME 510	Finite Element Methods	3
ME 518	Advanced Engineering Analysis	3
Physics		
PHYS 503	Electricity & Magnetism	3
PHYS 553	Quantum Mechanics	3