APPLIED MATHEMATICS, MS

for the Master of Science in Applied Mathematics

The MS in Applied Mathematics program is intended for students wishing to pursue a career in applied mathematics. It is also suitable as preparation for a PhD program in Applied Mathematics. It is rare for students to enter the PhD program at the University of Illinois Urbana-Champaign after finishing this degree. Students may choose one of three tracks: Optimization and Algorithms, Applications to the Sciences, or Computational Science and Engineering. This degree program requires 32 credit hours and can normally be completed in 18 months. A master's thesis is optional. Applications are accepted for Fall semester. Financial aid is generally not available.

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Students pursuing the M.S. in Applied Mathematics have the opportunity to customize the their studies the following ways:

- Through the Computational Science and Engineering Concentration. (http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/)
- By completing the coursework for the option in Optimization and Algorithms;
- By completing the coursework for the option in Applications to the Sciences;
- By completing the coursework for the option in Computational Science and Engineering.

For additional details and requirements refer to the Department of Mathematics Graduate Guide (https://math.illinois.edu/academics/graduate-program/forms-guidebooks-handbooks-life-resources/) and the Graduate College Handbook (http://www.grad.illinois.edu/gradhandbook/).

Thesis Option

Code	Title	Hours
For all options:		
Coursework to total 32 hours in MATH or ASRM (in consultation with advisor).		
MATH 599	Thesis Research	4
Choose one of these three (3) options:		
Optimization and Algorithms Option		
Courses from at least three (3) of the following areas: Optimization, Control Theory and Coding Theory, Combinatorics and Graph Theory, Algorithms and Theory of Computation, Statistics (including core courses listed below)		20
Select four (4) of the following:		12-16
MATH 412	Graph Theory	
MATH 413	Intro to Combinatorics	
MATH/CS 450	Numerical Analysis	
MATH/CS 473	Algorithms	
ASRM 450/ STAT 420	Methods of Applied Statistics	
MATH 482	Linear Programming	
MATH 484	Nonlinear Programming	
Applications to the the Sciences Option		
Select three (3) of the following:		9-16
MATH 489	Dynamics & Differential Eqns	
MATH 550	Dynamical Systems I	
MATH 553	Partial Differential Equations	
MATH 558	Methods of Applied Mathematics	
Credit hours in a department other than Mathematics, providing substantive applications of differential equations and applied mathematics.		8
Computational Science and Engineering Option		
MATH 550 or MATH 553	Dynamical Systems I Partial Differential Equations	4
Choose one (1) advanced course in Algebra or Analysis:		3-4
MATH 418	Intro to Abstract Algebra II	
MATH 448	Complex Variables	
MATH 540	Real Analysis	
MATH 542	Complex Variables I	
12 hours from CSE courses (at least 4 in MATH, 4 not in MATH)		12
Total Hours		**32**

Other Requirements

Code	Title	Hours
MATH 405, MATH 406, MATH 415, MATH 444, and MATH 499 cannot be counted toward this graduate degree.		
Minimum hours required within the unit:		20
Minimum 500-level hours required overall:		12 (8 in Mathematics)
Minimum GPA:		3.0
Total Hours (graduate study)		**32**

Non-Thesis Option

Code	Title	Hours
For all options:		
Coursework to total 32 hours in MATH or ASRM (in consultation with advisor).		
Choose one of these three (3) options:		
Optimization and Algorithms Option		
Courses from at least three (3) of the following areas: Optimization, Control Theory and Coding Theory, Combinatorics and Graph Theory, Algorithms and Theory of Computation, Statistics (including core courses listed below)		20
Select four (4) of the following:		12-16
MATH 412	Graph Theory	
MATH 413	Intro to Combinatorics	
MATH/CS 450	Numerical Analysis	
MATH/CS 473	Algorithms	
ASRM 450/ STAT 420	Methods of Applied Statistics	
MATH 482	Linear Programming	
MATH 484	Nonlinear Programming	
Applications to the the Sciences Option		

Select three (3) of the following:		9-16
MATH 489	Dynamics & Differential Eqns	
MATH 550	Dynamical Systems I	
MATH 553	Partial Differential Equations	
MATH 558	Methods of Applied Mathematics	
Credit hours in a department other than Mathematics, providing substantive applications of differential equations and applied mathematics.		8
Computational Science and Engineering Option		
MATH 550	Dynamical Systems I	4
or MATH 553	Partial Differential Equations	
Choose one (1) advanced course in Algebra or Analysis:		3-4
MATH 418	Intro to Abstract Algebra II	
MATH 448	Complex Variables	
MATH 540	Real Analysis	
MATH 542	Complex Variables I	
12 hours from CSE courses (at least 4 in MATH, 4 not in MATH)		12
Total Hours		**32**

Other Requirements

Code	Title	Hours
MATH 405, MATH 406, MATH 415, MATH 444, and MATH 499 cannot be counted toward this graduate degree.		
Minimum hours required within the unit:		20
Minimum 500-level hours required overall:		12
		(8 in Mathematics)
Minimum GPA:		3.0
Total Hours (graduate study)		**32**

for the Master of Science in Applied Mathematics

Optimization and Algorithms Track

1. Students will be able to explain and apply mathematical techniques from at least four of the seven core subjects of graph theory, combinatorics, numerical analysis, algorithms, applied statistics, linear programming, nonlinear programming.
2. Students will be able to apply mathematical concepts to solve problems in at least three of the following areas: optimization, control theory and coding theory, combinatorics/graph theory, algorithms/theory of computation, statistics.
3. For thesis track: Students will be able to effectively communicate extended arguments about the applications of mathematics in written form.

Applications to the Sciences Track

1. Students will be able to explain central definitions and theorems of differential equations and dynamical systems.
2. Students will be able to explain and apply mathematical modeling techniques that use differential equations and dynamical systems.
3. Students will be able to explain the application of mathematics to problem solving in one or more of the sciences.

4. For thesis track: Students will be able to effectively communicate extended arguments about the applications of mathematics in written form.

Computational Science and Engineering (CSE) Track

1. Students will be able to explain central definitions and theorems of differential equations and dynamical systems.
2. Students will be able to explain central definitions and theorems of at least one of the core subjects of abstract algebra or real/complex analysis.
3. Students will be able to use computational techniques to address mathematical problems in the sciences.
4. For thesis track: Students will be able to effectively communicate extended arguments about the applications of mathematics in written form.

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Graduate Degree Programs in Mathematics

- Actuarial Science, MS (http://catalog.illinois.edu/graduate/las/actuarial-science-ms/)
- Applied Mathematics, MS (p. 1)
- Mathematics, MS (http://catalog.illinois.edu/graduate/las/mathematics-ms/)
- Predictive Analytics and Risk Management, MS (http://catalog.illinois.edu/graduate/las/predictive-analytics-risk-management-ms/)
- Enterprise Risk Management (http://catalog.illinois.edu/graduate/las/predictive-analytics-risk-management-ms/enterprise-risk-management/)
- Financial and Insurance Analytics
- Mathematics, PhD (http://catalog.illinois.edu/graduate/las/mathematics-phd/)
  - optional concentrations:
    - Actuarial Science & Risk Analytics (http://catalog.illinois.edu/graduate/las/mathematics-phd/actuarial-science-risk-analytics/)
    - Computational Science and Engineering (http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/)
- Teaching of Mathematics, MS (http://catalog.illinois.edu/graduate/las/teaching-mathematics-ms/)

for the Master of Science in Applied Mathematics

Mathematics Department

Department Chair: Vera Hur
Director of Graduate Studies: Jared Bronski
Mathematics Department faculty (https://math.illinois.edu/directory/faculty/)
Mathematics faculty research (https://math.illinois.edu/research/faculty-research/)

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College of Liberal Arts & Sciences

College of Liberal Arts & Sciences website (https://las.illinois.edu/)

Admissions

Mathematics Admissions & Requirements (https://math.illinois.edu/admissions/graduate-program-mathematics-admissions/#MS-AppliedMath)
Graduate College Admissions & Requirements (https://grad.illinois.edu/admissions/apply/)