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 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://files.webservices.illinois.edu/7917/GraduateGuide18-19.pdf) and the Graduate College Handbook (http://www.grad.illinois.edu/gradhandbook/).

Thesis Option

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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tr>
<td>MATH 599</td>
<td>Thesis Research</td>
<td>4</td>
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Choose one of these three (3) options:

Optimization and Algorithms Option

Courses from at least three (3) of the following areas:

- Optimization
- Control Theory
- Coding Theory
- Combinatorics
- Graph Theory
- Algorithms
- Theory of Computation
- Statistics (including core courses listed below)

Select four (4) of the following:

- 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 Sciences Option

Select three (3) of the following:

- MATH 489 Dynamics & Differential Eqns
- MATH 550 Dynamical Systems I

Non-Thesis Option

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
- Coding Theory
- Combinatorics
- Graph Theory
- Algorithms
- Theory of Computation
- Statistics (including core courses listed below)

Select four (4) of the following:

- 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 Sciences Option

Select three (3) of the following:

- MATH 489 Dynamics & Differential Eqns
- MATH 550 Dynamical Systems I
Computational Science and Engineering Option

1. Students will gain a fundamental understanding of the theory of differential equations/dynamical systems.
2. Students will gain a fundamental understanding, at the graduate level, of at least one of the core subjects of abstract algebra, real analysis, complex analysis.
3. Students will gain an understanding of the use of computational techniques in the study of applied mathematics.
4. Students will gain experience in original research in applied mathematics, if desired. This goal applies to students on the thesis track of this program.

for the Master of Science in Applied Mathematics

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/)

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Optimization and Algorithms Track

1. Students will gain a fundamental understanding of the theory of differential equations/dynamical systems.
2. Students will gain breadth of knowledge in at least three of the following areas: optimization, control theory and coding theory, combinatorics/graph theory, algorithms/theory of computation, statistics.
3. Students will gain experience in original research in applied mathematics, if desired. This goal applies to students on the thesis track of this program.

Applications to the Sciences Track

1. Students will gain depth of understanding of the theory of differential equations and dynamical systems.
2. Students will gain the ability to engage with theoretical mathematical thinking in areas relevant to the application of differential equations and dynamical systems to the sciences, at the graduate level.
3. Students will gain exposure to the application of mathematics in one or more of the sciences.
4. Students will gain experience in original research in applied mathematics, if desired. This goal applies to students on the thesis track of this program.

Computational Science and Engineering (CSE) Track

1. Students will gain a fundamental understanding of the theory of differential equations/dynamical systems.
2. Students will gain a fundamental understanding, at the graduate level, of at least one of the core subjects of abstract algebra, real analysis, complex analysis.
3. Students will gain an understanding of the use of computational techniques in the study of applied mathematics.
4. Students will gain experience in original research in applied mathematics, if desired. This goal applies to students on the thesis track of this program.

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Other Requirements

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<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td>Total Hours</td>
<td>32</td>
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Minimum GPA: 3.0

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Graduate College Admissions & Requirements (https://grad.illinois.edu/admissions/apply/)

Information listed in this catalog is current as of 01/2024