APPLIED MATHEMATICS, MS

for the Master of Science in Applied Mathematics

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department chair: Jeremy Tyson
director of graduate studies: Lee DeVille
overview of admissions & requirements: https://grad.illinois.edu/admissions/apply

department website: http://www.math.illinois.edu
program website: https://math.illinois.edu/admissions/graduate-program-mathematics-admissions#MS-AppliedMath

department faculty: https://math.illinois.edu/research/faculty-research
and https://las.illinois.edu/directory/faculty-by-type

college website: https://las.illinois.edu/
department office: 273 Altgeld Hall, 1409 West Green Street, Urbana, IL 61801
phone: (217) 333-5749
department email: math-grad@illinois.edu

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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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/)
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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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.
- 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/).

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Thesis Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>For all options: Coursework to total 32 hours in MATH or ASRM (in consultation with advisor).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 599</td>
<td>Thesis Research</td>
<td>4</td>
</tr>
<tr>
<td>Choose one of these three (3) options:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Select four (4) of the following:</td>
<td>12-16</td>
<td></td>
</tr>
<tr>
<td>MATH 412</td>
<td>Graph Theory</td>
<td></td>
</tr>
<tr>
<td>MATH 413</td>
<td>Intro to Combinatorics</td>
<td></td>
</tr>
<tr>
<td>MATH/CS 450</td>
<td>Numerical Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH/CS 473</td>
<td>Algorithms</td>
<td></td>
</tr>
<tr>
<td>ASRM 450/</td>
<td>Methods of Applied Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 420</td>
<td>Linear Programming</td>
<td></td>
</tr>
<tr>
<td>MATH 482</td>
<td>Nonlinear Programming</td>
<td></td>
</tr>
</tbody>
</table>

Applications to the Sciences Option

Select three (3) of the following: 9-16

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 489</td>
<td>Dynamics &amp; Differential Eqns</td>
<td></td>
</tr>
<tr>
<td>MATH 550</td>
<td>Dynamical Systems I</td>
<td></td>
</tr>
<tr>
<td>MATH 553</td>
<td>Partial Differential Equations</td>
<td></td>
</tr>
<tr>
<td>MATH 558</td>
<td>Methods of Applied Mathematics</td>
<td>8</td>
</tr>
</tbody>
</table>

Credit hours in a department other than Mathematics, providing substantive applications of differential equations and applied mathematics.

Computational Science and Engineering Option

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 550</td>
<td>Dynamical Systems I</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 553</td>
<td>Partial Differential Equations</td>
<td></td>
</tr>
</tbody>
</table>

Choose one (1) advanced course in Algebra or Analysis: 3-4

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 418</td>
<td>Intro to Abstract Algebra II</td>
<td></td>
</tr>
<tr>
<td>MATH 448</td>
<td>Complex Variables</td>
<td></td>
</tr>
<tr>
<td>MATH 540</td>
<td>Real Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 542</td>
<td>Complex Variables I</td>
<td></td>
</tr>
</tbody>
</table>

Information listed in this catalog is current as of 07/2021
12 hours from CSE courses (at least 4 in MATH, 4 not in MATH)

**Total Hours**

32

### Other Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 405, MATH 406, MATH 415, MATH 444, and MATH 499 cannot be counted toward this graduate degree.</td>
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</tr>
</tbody>
</table>

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

**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)

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 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.

**Computational Science and Engineering Option**

MATH 550 Dynamical Systems I

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)

**Total Hours**

32

Information listed in this catalog is current as of 07/2021