Mathematics, M.S.

Requirements

The Master of Science program in mathematics requires a minimum of 30 s.h. of graduate credit. Students earn the degree through courses and comprehensive examinations. There is no M.S. thesis. Requirements (courses and comprehensive examination areas) may be modified with the department’s consent.

Four different programs (I, II, III, and IV) lead to the M.S. in mathematics.

Program I

Program I prepares students for further study of pure and applied mathematics and for employment in government and business. Students in Program I take several courses and pass two comprehensive examinations. They must earn a grade of B-minus or higher in six of the courses and maintain a g.p.a. of at least 2.75 in all mathematics courses taken for the degree.

Program I requires the following courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:5000 &amp; MATH:5010</td>
<td>Abstract Algebra I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:5200 &amp; MATH:5210</td>
<td>Introduction to Analysis I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:5400</td>
<td>Fundamental Groups and Covering Spaces</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5410</td>
<td>Introduction to Smooth Manifolds</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5600</td>
<td>Nonlinear Dynamics with Numerical Methods</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5700</td>
<td>Introduction to Partial Differential Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

The two comprehensive examinations are chosen from algebra, analysis, differential equations with numerical methods, and topology.

Program II

Program II is designed for secondary school teachers. Program II requirements are similar to those for Programs I and III, but Program II students complete two mathematics education courses and a minimum of 24 s.h. in Department of Mathematics courses. The following courses may be used to satisfy the program II mathematics course requirements.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:3600</td>
<td>Introduction to Ordinary Differential Equations</td>
<td>2-3</td>
</tr>
</tbody>
</table>

Mathematics courses (prefix MATH) numbered 4000 or above

Students are encouraged to consult with the mathematics education faculty when planning their course of study.

Program III

Program III focuses on applied mathematics. Students in Program III take several courses and pass two comprehensive examinations. Students must earn a grade of B-minus or higher in six of the courses and maintain a g.p.a. of at least 2.75 in all mathematics courses taken for the degree.

Program III requires the following courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:5200 &amp; MATH:5210</td>
<td>Introduction to Analysis I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:5600</td>
<td>Nonlinear Dynamics with Numerical Methods</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5700</td>
<td>Introduction to Partial Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5800</td>
<td>Numerical Analysis: Nonlinear Equations and Approximation Theory</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5810</td>
<td>Numerical Analysis: Differential Equations and Linear Algebra</td>
<td>4</td>
</tr>
</tbody>
</table>

Both courses in group A, or two courses from group B:

Group A

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:5400</td>
<td>Fundamental Groups and Covering Spaces</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5410</td>
<td>Introduction to Smooth Manifolds</td>
<td>4</td>
</tr>
</tbody>
</table>

Group B

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:4060</td>
<td>Discrete Mathematical Models</td>
<td>3</td>
</tr>
<tr>
<td>MATH:4610</td>
<td>Continuous Mathematical Models</td>
<td>3</td>
</tr>
<tr>
<td>MATH:4820</td>
<td>Optimization Techniques</td>
<td>3</td>
</tr>
</tbody>
</table>

The two comprehensive examinations are chosen from analysis, differential equations with numerical methods, numerical analysis, and topology.

Program IV

Program IV is designed for nondepartmental students working toward a Ph.D. in areas of study that require mathematical knowledge. The program has no specific required courses.

Students in Program IV are considered to have passed the comprehensive examination for the master's degree in mathematics if they have maintained a g.p.a. of at least 3.00 in all mathematics courses taken for the M.S. in mathematics and have successfully completed the Ph.D. comprehensive examination in their area of study.

Students in Program IV are assigned a mathematics advisor, who works with them and their major advisor to plan an appropriate curriculum for the M.S. in mathematics. A suitable program of study should be approved by a mathematics advisor before the student takes the Ph.D. comprehensive examination, and a member of the mathematics faculty should serve on the Ph.D. comprehensive examination committee.

Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website. Applicants to the Ph.D. program have preference for admission and funding.

Admission to Programs I, II, and III is competitive and based on a combination of undergraduate coursework and grades,
letters of recommendation, and test scores. Numerical standards change every year or so; exceptions may be made to the following guidelines.

Applicants must have completed work in an undergraduate program equivalent to the major in mathematics offered by the University of Iowa Department of Mathematics with an undergraduate g.p.a. of at least 3.20. Relevance and difficulty of courses are considered when evaluating grades; grades of C or lower in mathematics courses must be balanced by grades of A. Individuals whose preparation does not meet this requirement may be admitted conditionally and are asked to take specific courses that cover deficiencies.

All applicants must submit three letters of recommendation.

Applicants whose first language is not English must submit official test scores to verify English proficiency. Applicants can verify English proficiency by submitting official test scores from the Test of English as a Foreign Language (TOEFL). English proficiency demonstrated by a score of at least 100 (internet-based) on TOEFL is expected. The International English Language Testing System (IELTS) with an overall score of 7 with no subscore less than 6 or the Duolingo English Test (DET) with a score of 105 or above also are accepted.

**Career Advancement**

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.