### Graduate Degree Programs in Mathematics

**Actuarial Science, MS** ([http://catalog.illinois.edu/graduate/las/actuarial-science-ms/](http://catalog.illinois.edu/graduate/las/actuarial-science-ms/))

**Applied Mathematics, MS** ([http://catalog.illinois.edu/graduate/las/applied-mathematics-ms/](http://catalog.illinois.edu/graduate/las/applied-mathematics-ms/))

#### Optional concentrations:

- Actuarial Science ([Actuarial Science](https://las.illinois.edu/actuarial-science-risk-analytics/))
- Computational Science and Engineering ([http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/](http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/))

**Mathematics, MS** ([http://catalog.illinois.edu/graduate/las/mathematics-ms/](http://catalog.illinois.edu/graduate/las/mathematics-ms/))

#### Optional concentration:

- Computational Science and Engineering ([http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/](http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/))

**Mathematics, PhD** ([http://catalog.illinois.edu/graduate/las/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/](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/](http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/))

Teaching of Mathematics, MS ([http://catalog.illinois.edu/graduate/las/teaching-mathematics-ms/](http://catalog.illinois.edu/graduate/las/teaching-mathematics-ms/))

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**For the Doctor of Philosophy in Mathematics, Actuarial Science and Risk Analytics Concentration**

Students working toward a Ph.D. degree usually require four to six years to complete the requirements. Each student must pass the comprehensive examinations (testing the student’s knowledge of basic graduate-level mathematics in algebra, analysis, and other areas) and the preliminary examination (testing the student’s ability to begin or continue research in a chosen field). Students must also write and defend a research thesis in their field of mathematics.

For additional details and requirements refer to the department’s Guide to Graduate Studies ([https://files.webservices.illinois.edu/7917/GraduateGuide18-19.pdf](https://files.webservices.illinois.edu/7917/GraduateGuide18-19.pdf)) and the Graduate College Handbook ([http://www.grad.illinois.edu/gradhandbook/](http://www.grad.illinois.edu/gradhandbook/)).

### Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 540</td>
<td>Real Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH 561</td>
<td>Theory of Probability I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 563</td>
<td>Risk Modeling and Analysis</td>
<td>4</td>
</tr>
<tr>
<td>STAT 510</td>
<td>Mathematical Statistics I</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of:

- MATH 511 Intro to Algebraic Geometry
- MATH 518 Differentiable Manifolds I
- MATH 525 Algebraic Topology I
- MATH 530 Algebraic Number Theory
- MATH 531 Analytic Theory of Numbers I
- MATH 542 Complex Variables I
- MATH 550 Dynamical Systems I
- MATH 553 Partial Differential Equations
- MATH 570 Mathematical Logic
- MATH 580 Combinatorial Mathematics

Students must also demonstrate proficiency in undergraduate complex analysis, which can be done by a B+ in MATH 448, a B+ in MATH 542, or by passing the exam associated to MATH 542.

**Students must demonstrate competence in the following:**

- MATH 564 Applied Stochastic Processes
- STAT 425 Applied Regression and Design: 3 or 4
- FIN 591 Theory of Finance

**Students must demonstrate competence in two of the following:**

- ASRM 575 Life Insurance and Pension Mathematics
- ASRM 510 Financial Mathematics
- ASRM 561 Loss Data Analytics & Credibility

**Master's equivalency:**

- MATH 599 Thesis Research (0 min applied toward degree)

**Total Hours required for the degree:**

96

### Other requirements

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

64 hours in residence
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Requirement Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters Degree Required for Admission to PhD</td>
<td>No</td>
</tr>
<tr>
<td>Comprehensive Exam Required</td>
<td>Yes</td>
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<tr>
<td>Preliminary Exam Required</td>
<td>Yes</td>
</tr>
<tr>
<td>Final Exam/Dissertation Defense Required</td>
<td>Yes</td>
</tr>
<tr>
<td>Dissertation Deposit Required</td>
<td>Yes</td>
</tr>
<tr>
<td>Minimum GPA</td>
<td>3.25</td>
</tr>
</tbody>
</table>

1. To demonstrate competence, a student must receive a B+ or higher in the course, or pass a written exam on the topic.