The Concentration attracts students with strong interest in financial risk analytics and actuarial applications of mathematics, and equips them with advanced analytical tools for professional and academic careers. Students in the Concentration complete coursework or professional exams in Probability, Risk Modeling and Analysis, Mathematical Statistics, Theory of Finance, and Actuarial Models for Life Contingencies or Financial Economics.

Graduate Degree Programs in Mathematics

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

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

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 (p. 1)
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)
Computational Science and Engineering (http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering)

Students working toward a Ph.D. degree usually require four to six years to complete the requirements. Each student must pass the comprehensive examinations/courses 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) and the Graduate College Handbook (http://www.grad.illinois.edu/gradhandbook).

### Requirements

**Code** | **Title** | **Hours**
--- | --- | ---
**Students must demonstrate competence in five core courses including the following:** |  |
MATH 540 | Real Analysis | 4
MATH 561 | Theory of Probability I | 4
MATH 563 | Risk Modeling and Analysis | 4
STAT 510 | Mathematical Statistics I | 4
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.** |  |
MATH 564 | Applied Stochastic Processes | 4
STAT 425 | Applied Regression and Design | 3 or 4
FIN 591 | Theory of Finance | 4
**Students must demonstrate competence in two of the following:** |  |
ASRM 575 | Life Insurance and Pension Mathematics | 4
ASRM 510 | Financial Mathematics | 4
ASRM 561 | Loss Data Analytics & Credibility | 4
**Master's equivalency** | 32
MATH 599 | Thesis Research (0 min applied toward degree) | 0
**Total Hours required for the degree** | 96

### Other requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Other requirements may overlap.</td>
<td></td>
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<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>
<td>64 hours in residence</td>
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<tr>
<td>Masters Degree Required for Admission to PhD</td>
<td>No</td>
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<tr>
<td>Comprehensive Exam Required</td>
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<td>Preliminary Exam Required</td>
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<td>Requirement</td>
<td>Requirement Type</td>
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<tr>
<td>Final Exam/Dissertation Defense</td>
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<tr>
<td>Required</td>
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<td>Dissertation Deposit Required</td>
<td>Yes</td>
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<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.