PhD in Mathematics

Admission Contact Information
Stephen Montgomery-Smith, Director of Graduate Studies
222 Mathematical Sciences Building
Columbia, MO 65211
(573) 882-6221
email: muismathdgs@missouri.edu

Admission Criteria

Note: Applicants for any graduate degree in mathematics should submit an application for graduate study. International Applicants applying from outside North America who seek financial support from the Department will only be considered for the PhD program.

Fall deadline: January 15

- While a bachelor's degree from an accredited institution is required, the undergraduate major need not be mathematics as long as applicants have had sufficient mathematics training to qualify for 8000-level courses during the first three semesters of graduate work.
- Minimum TOEFL scores:
  - Internet-based test (iBT) 61 Effective July 1, 2015 must have score of 80.
  - Paper-based test (PBT) 500 Effective July 1, 2015 must have score of 550.

Important Notes: International applicants seeking departmental support are required to have a minimum TOEFL score of 85 (Internet-based test) or equivalent. An ibtTOEFL Speaking subscore of 22 or higher is preferred.
- Minimum IELTS score: 5.5

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>OVERALL</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Required Application Materials

- 3 or more letters of recommendation from your professors or persons who assess in detail your academic performance and potential.
- Transcripts
- Personal Statement
- GRE scores (required for PhD application, strongly recommended for Masters application)
- TOEFL or IELTS (International students only)

Note: The application is submitted through the Office of Graduate Studies’ ApplyYourself (http://gradschool.missouri.edu/admissions) system. This includes the online credit card payment $55.00 US for U.S. Citizens and Permanent Residents, $75.00 US for Non-Resident International applicants.

Completing the ApplyYourself Application:

The application consists of four subsections:
- Personal Information: Complete all information as requested.
- Application Information: Applications are considered only starting Fall Semester, and only for Full-time study. Select a degree from the Graduate Degrees offered by the MU Mathematics Department.
- Indicate your selection for the Mathematics Doctor of Philosophy (PhD)
- Admissions Category: Graduate Degree Sought at MU: Doctorate
- Graduate Program to which you are seeking admissions: Mathematics Doctor of Philosophy (PhD)
- Educational History: Complete all information as requested.
- Test Information:
  - The GRE General Test is required for application to the PhD program in Mathematics, and are strongly recommended for Masters applicants. GRE General Test scores sent directly from the ETS will be considered as part of an application if available. The GRE Subject Test is not required, will be considered if submitted.
  - MU's Institutional Code for the GRE is: 6875.
  - MU's Institutional Code for the TOEFL is: 6875.

Supplemental Information:

- (required) Upload your Personal Statement, Statement of Goals or Statement of Purpose.
- Please indicate the specific degree for which you are applying, any additional degrees for which you may later apply, and explain your reasons for choosing to pursue these degrees at the University of Missouri.
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RECOMMENDATIONS: The ApplyYourself system will let you request confidential online recommendation letters from your recommendation providers. You need to provide the names and email addresses of recommendation providers who have agreed in advance to write letters for you. The Mathematics Department application requires at least three recommendation letters from your professors (or persons who assess in detail your academic performance and potential).

International Applicants Only

- Unofficial copies of TOEFL/IELTS reports uploaded by applicant can be used for initial evaluation - official transcripts sent directly to the Graduate Admissions Office will still be required to finalize admission
- Unofficial copies of GRE reports uploaded by applicant can be used for initial evaluation

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International Applicants Only

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- Affidavit of Support for International Applicants: It is not necessary to complete this form. International applicants are required to complete the Affidavit of Support OR provide a letter of support from a University of Missouri graduate degree program before immigration documents can be issued. All international admissions to the Mathematics graduate program come with financial support which suffices to meet this requirement.
The following (paper) application materials must be on file at the Graduate Admissions office before an admission offer can be finalized:

- Official transcripts/mark sheets from each college or university you have attended (sent directly from the college or university). Applicants with degrees from outside the United States must provide academic credentials in both the native language and in English.
- Official TOEFL or IELTS scores (sent directly from the testing service). Please review the Graduate School's policy regarding proof of English Language proficiency.

Please arrange to have these materials mailed to the following address:

University of Missouri-Columbia
Graduate Admissions
210 Jesse Hall
Columbia, MO 65211
1-800-877-6312
(573) 884-8488

PhD Degree Completion Requirements

This is a professional research degree designed to prepare students for various advanced professional careers, including college teaching and research. Before formally becoming a candidate, a student must have training equivalent to that required for a master’s degree.

Year 0 courses include basic advanced undergraduate material, which incoming Ph.D. students are required to master before engaging in graduate coursework. Well prepared incoming students can petition to skip some or all of the Year 0 courses. The Director of Graduate Studies will administer an informal exam to see if the students are sufficiently ready to skip Year 0 courses.

<table>
<thead>
<tr>
<th>Fall</th>
<th>CR</th>
<th>Spring</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 7700</td>
<td>3</td>
<td>MATH 7900</td>
<td>3</td>
</tr>
<tr>
<td>MATH 8655</td>
<td>3</td>
<td>MATH 7940</td>
<td>3</td>
</tr>
<tr>
<td>MATH 7920</td>
<td>3</td>
<td>MATH 7720</td>
<td>3</td>
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<tr>
<td></td>
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<td>9</td>
</tr>
</tbody>
</table>

Total Credits: 18

Year 1 courses will train students to develop a common solid foundation on basic graduate mathematics. The Ph.D. student is required to pass all 6 courses, and to pass qualifying exams in Algebra and Real Analysis. The qualifying exams will be given in May of each year, shortly after finals week. There will be an opportunity to retake a qualifying exam in August just before the beginning of the Fall semester. The Analysis qualifying exams will be from topics from Real Analysis I and Real Analysis II. The Algebra qualifying exams will be from topics from Algebra I and Algebra II.

Extremely well prepared students, with the permission of their initial advisor and the Director of Graduate studies, may skip one or both qualifying exams in August just before the beginning of their first semester. If they pass, then with the permission of their initial advisor and the Director of Graduate studies they may skip the corresponding courses in Year 1.

Year 1: Take All 6

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall</th>
<th>CR</th>
<th>Spring</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 8420</td>
<td>3</td>
<td>MATH 8421</td>
<td>3</td>
<td></td>
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<tr>
<td>MATH 8410</td>
<td>3</td>
<td>MATH 8411</td>
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</table>

Total Credits: 18

† Here, and elsewhere in this document, the number after the period refers to the section number.

Year 2 and above are the post-qual core courses. Every Ph.D. student must complete at least six of the post-qual core courses. (Note that the parity of the year is determined by the beginning of the AY. For example, Spring 2016 occurs in the beginning of AY 2015, and so would be considered to be in an odd year.)

Year 2 and above: Minimum 6 classes

Even Years

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 8630</td>
<td>Harmonic Analysis I</td>
</tr>
<tr>
<td>MATH 8402</td>
<td>Harmonic Analysis II</td>
</tr>
<tr>
<td>MATH 8440</td>
<td>Advanced Ordinary Differential Equations I</td>
</tr>
<tr>
<td>MATH 8302</td>
<td>Topics in Harmonic Analysis</td>
</tr>
<tr>
<td>MATH 8102</td>
<td>Topics in Algebra (Algebraic Number Theory)</td>
</tr>
<tr>
<td>MATH 8480</td>
<td>Advanced Probability</td>
</tr>
<tr>
<td>MATH 8102</td>
<td>Topics in Algebra (Commutative Algebra I)</td>
</tr>
<tr>
<td>MATH 8650</td>
<td>Differentiable Manifolds and Riemannian Geometry</td>
</tr>
<tr>
<td>MATH 8628</td>
<td>Functional Analysis I</td>
</tr>
<tr>
<td>MATH 8102</td>
<td>Topics in Algebra (Commutative Algebra II)</td>
</tr>
<tr>
<td>MATH 8445</td>
<td>Partial Differential Equations I</td>
</tr>
<tr>
<td>MATH 8631</td>
<td>Harmonic Analysis II</td>
</tr>
</tbody>
</table>

Odd Years

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 8630</td>
<td>Harmonic Analysis I</td>
</tr>
<tr>
<td>MATH 8416</td>
<td>Harmonic Analysis II</td>
</tr>
<tr>
<td>MATH 8445</td>
<td>Partial Differential Equations I</td>
</tr>
<tr>
<td>MATH 8446</td>
<td>Partial Differential Equations II</td>
</tr>
<tr>
<td>MATH 8440</td>
<td>Advanced Ordinary Differential Equations I</td>
</tr>
<tr>
<td>MATH 8480</td>
<td>Advanced Probability</td>
</tr>
<tr>
<td>MATH 8202</td>
<td>Topics in Functional Analysis (.1)</td>
</tr>
<tr>
<td>MATH 8615</td>
<td>Algebraic Geometry I</td>
</tr>
<tr>
<td>MATH 8616</td>
<td>Algebraic Geometry II</td>
</tr>
</tbody>
</table>

Some of the above courses are listed in the catalog under different names. Others are new courses, and are currently listed as topics courses until we are able to add them to the catalog.

The candidate must further complete a course of study approved by the doctoral program committee and pass a comprehensive examination. The active areas of research interest of the current members of the staff are: algebraic geometry, analysis (real, complex, functional and harmonic), analytic functions, applied mathematics, financial mathematics and mathematics of insurance, commutative rings, scattering theory,
differential equations (ordinary and partial), differential geometry, dynamical systems, general relativity, mathematical physics, number theory, probabilistic analysis and topology.

Note: Effective at the start of Winter Semester 2007, there is NO foreign language proficiency requirement for the Mathematics PhD. However, a student's Doctoral Committee still retains the discretion to impose a foreign language proficiency requirement.