BACHELOR OF SCIENCE (BS) DEGREE WITH A MAJOR IN MATHEMATICS

Program Learning Outcomes for the BS Degree with a Major in Mathematics

Upon completing the BS degree with a major in Mathematics, students will be able to:

1. Achieve both practical and theoretical fluency in calculus and linear algebra.
2. Acquire a broad background at the undergraduate level in all the major areas of mathematics, including analysis, algebra, and geometry.
3. Learn to read and write proofs.

Requirements for the BS Degree with a Major in Mathematics

For general university requirements, see Graduation Requirements. Students pursuing the BS degree with a major in Mathematics must complete:

- A minimum of 14-17 courses (42-51 credit hours), depending on course selection, to satisfy the major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 60 credit hours outside of major requirements.
- A minimum of 11 courses (33 credit hours) taken at the 300-level or above.

Students receive advanced placement (AP) credit by achieving a score of 4 or 5 on the AP AB-level test or by achieving a score of 4 or 5 on the BC-level test. The credit is articulated as MATH 105 or MATH 106. Declared MATH majors who have had calculus but have not taken the AP test may petition the department for a waiver of the calculus requirements. Entering students should enroll in the most advanced course commensurate with their background; advice is available from the mathematics faculty during Orientation Week and at other times.

The chair of the MATH department’s undergraduate committee may modify requirements to meet the needs of specific advanced students. If a MATH course is repeatable for credit, the course may only be repeated once.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major’s academic advisor, or where applicable, the department’s Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major’s Official Certifier.) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Mathematics</td>
<td>42-51</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours Required for the BS Degree with a Major in Mathematics</td>
<td>120</td>
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Degree Requirements

<table>
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<th>Code</th>
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<th>Credit Hours</th>
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Core Requirements

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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Single Variable Calculus

- MATH 101 SINGLE VARIABLE CALCULUS I
- or MATH 105 AP/OTH CREDIT IN CALCULUS I
- MATH 102 SINGLE VARIABLE CALCULUS II
- or MATH 106 AP/OTH CREDIT IN CALCULUS II

Differential Equations

Select 1 course from the following:

- MATH 211 ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA
- MATH 220 HONORS ORDINARY DIFFERENTIAL EQUATIONS
- MATH 381 INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS
- MATH 423 / CAAM 423 PARTIAL DIFFERENTIAL EQUATIONS I

Multivariable Calculus

Select 1 from the following:

- MATH 212 MULTIVARIABLE CALCULUS
- MATH 221 HONORS CALCULUS III
- and MATH 222 HONORS CALCULUS IV

Linear Algebra

Select 1 from the following:

- MATH 221 HONORS CALCULUS III
- MATH 354 HONORS LINEAR ALGEBRA
- MATH 355 LINEAR ALGEBRA

Real Analysis

Select 2 courses from the following:

- MATH 321 INTRODUCTION TO ANALYSIS I
- MATH 322 INTRODUCTION TO ANALYSIS II
- MATH 331 HONORS ANALYSIS
- MATH 425 INTEGRATION THEORY

Algebra

- MATH 356 ABSTRACT ALGEBRA I
- MATH 463 ABSTRACT ALGEBRA II

Geometry and Manifolds

Select 1 course from the following:

- MATH 370 CALCULUS ON MANIFOLDS
- MATH 401 DIFFERENTIAL GEOMETRY OF CURVES AND SURFACES
- MATH 402 DIFFERENTIAL GEOMETRY

Complex Analysis

- MATH 382 COMPUTATIONAL COMPLEX ANALYSIS
- or MATH 427 COMPLEX ANALYSIS
## Bachelor of Science (BS) Degree with a Major in Mathematics

### Topology

Select 1 course from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>MATH 443</td>
<td>GENERAL TOPOLOGY</td>
</tr>
<tr>
<td>MATH 444</td>
<td>GEOMETRIC TOPOLOGY</td>
</tr>
<tr>
<td>MATH 445</td>
<td>ALGEBRAIC TOPOLOGY</td>
</tr>
</tbody>
</table>

### Elective Requirements

Students must complete a minimum of 33 credit hours from departmental (MATH) course offerings at the 300-level or above.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit Hours Required for the Major in Mathematics</td>
<td>42-51</td>
</tr>
<tr>
<td>Additional Credit Hours to Complete BS Degree Requirements</td>
<td>9-18</td>
</tr>
<tr>
<td>University Graduation Requirements</td>
<td>60</td>
</tr>
</tbody>
</table>

Total Credit Hours 120

### Opportunities for the BS Degree with a Major in Mathematics

### Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

### Additional Information

For additional information, please see the Mathematics website: https://math.rice.edu/

### Policies for the BS Degree with a Major in Mathematics

#### Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of transfer credit advisors on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

#### Departmental Transfer Credit Guidelines

Students pursuing the major in Mathematics should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program's official transfer credit advisor) on an individual case-by-case basis.

#### Additional Information

For additional information, please see the Mathematics website: https://math.rice.edu/

### Footnotes and Additional Information

* Includes coursework completed as distribution credit, FWIS, LPAR, upper-level, residency (hours taken at Rice), 60 hours outside of the major (if applicable), and any additional academic program requirements. The “hours outside of the major” requirement may include all of the above university requirements.

1 The Elective Requirements can include courses taken from the Core Requirements and/or Elective coursework, for a minimum of 11 courses (33 credit hours) at the 300-level or above. At most, students can take 1 course (3 credit hours) for any given course number to use toward the major. Additionally, at most 3 credit hours from courses numbered MATH 490 through MATH 499 (research and supervised reading courses) can count towards major requirements.