Mathematics B.S.

Click here to view the Suggested Plan of Study (p. 3)

**General Education Foundations**

Please use this link to view a list of courses that meet each GEF requirement. ([http://registrar.wvu.edu/gef/](http://registrar.wvu.edu/gef/))

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

**General Education Foundations**

<table>
<thead>
<tr>
<th>F1 - Composition &amp; Rhetoric</th>
<th>3-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 101</td>
<td>Introduction to Composition and Rhetoric</td>
</tr>
<tr>
<td>&amp; ENGL 102</td>
<td>and Composition, Rhetoric, and Research</td>
</tr>
<tr>
<td>or ENGL 103</td>
<td>Accelerated Academic Writing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F2A/F2B - Science &amp; Technology</th>
<th>4-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3 - Math &amp; Quantitative Reasoning</td>
<td>3-4</td>
</tr>
<tr>
<td>F4 - Society &amp; Connections</td>
<td>3</td>
</tr>
<tr>
<td>F5 - Human Inquiry &amp; the Past</td>
<td>3</td>
</tr>
<tr>
<td>F6 - The Arts &amp; Creativity</td>
<td>3</td>
</tr>
<tr>
<td>F7 - Global Studies &amp; Diversity</td>
<td>3</td>
</tr>
<tr>
<td>F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)</td>
<td>9</td>
</tr>
</tbody>
</table>

Total Hours: 31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

**Degree Requirements**

Students must complete WVU General Education Foundations requirements, College B.S. requirements, major requirements, and electives to total a minimum of 120 hours. For complete details on these requirements, visit the B.S. Degrees tab on the Eberly College of Arts and Sciences ([http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/#bachelorofsciencetext](http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/#bachelorofsciencetext)).

**Departmental Requirements for the B.S. in Mathematics**

- **Capstone Requirement**: The university requires the successful completion of a Capstone course. Mathematics majors must complete MATH 495.

- **Writing and Communication Skills Requirement**: Mathematics Bachelor of Arts students fulfill the Writing and Communication Skills requirement by completing ENGL 101 and ENGL 102 (or ENGL 103), and two additional SpeakWrite Certified Courses TM. MATH 495, and one additional course from the following: COMM 302, HIST 203, HIST 204, HIST 207, HIST 221, HIST 241, HIST 242, HIST 250, HIST 264, HIST 259, PHIL 301, PHIL 302, PHIL 306, PHIL 310, PHYS 376L, RELG 219, RELG 223, RELG 230, RELG 231, WRIT 304, WRIT 305.

- **Calculation of the GPA in the Major**: A minimum GPA of 2.0 is required in all classes applied to the major requirements. If a class is repeated, all attempts will be included in the calculation of the GPA unless the course is eligible for a D/F repeat.

- **Advanced Mathematics Coursework**: Students have the option of completing 18 credits of advanced Mathematics electives, or to complete one of six Areas of Emphasis for 18 credits (please consult the AoE tab). Courses applied to an AoE or to the advanced mathematics electives may not overlap with the courses taken for the Foundation or the Mathematical programming sections.

**Curriculum Requirements**

| University Requirements | 57 |
| ECAS B.S. Requirements | 16 |
| Mathematics Major Requirements | 47 |
| Total Hours | 120 |

**University Requirements**

General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)

Outstanding GEF Requirements 1, 4, 5, 6, and 7 | 22
Mathematics B.S.

MATH 191  First-Year Seminar 1
General Electives 34
Total Hours 57

ECAS Bachelor of Science Requirements

ECAS B.S. REQUIREMENTS 16
Global Studies & Diversity Requirement
Mathematics requirement: fulfilled by major requirements
Science Requirement (select 2 areas)
Total Hours 16

Please see the Eberly College of Arts and Sciences Bachelor of Science (http://catalog.wvu.edu/undergraduate/eberlycollegeofartsandsciences/#bachelorofsciencetext) catalog page.

Mathematical Major Requirements

FOUNDATION COURSES 22
MATH 153  Calculus 1a with Precalculus
& MATH 154  and Calculus 1b with Precalculus
or MATH 155  Calculus 1
MATH 156  Calculus 2
MATH 251  Multivariable Calculus
MATH 261  Elementary Differential Equations
MATH 303  Introduction to the Concepts of Mathematics
MATH 343  Introduction to Linear Algebra
or MATH 441  Applied Linear Algebra
STAT 215  Introduction to Probability and Statistics

MATHEMATICAL PROGRAMMING 3
MATH 322  Introduction to Programming and Computational Mathematics
or MATH 420  Numerical Analysis 1

ADVANCED MATHEMATICS COURSEWORK 18
Option 1: General Mathematics Electives
MATH 451  Introduction to Real Analysis 1
MATH 341  Introduction to Algebraic Structures
or MATH 381  Introduction to Analysis and Topology
or MATH 456  Complex Variables
4 MATH courses at the 300-level or above **

Option 2: Area of Emphasis
Select one AoE from the list below:
Actuarial Science
Computational Mathematics
Mathematical Biology
Mathematics Education
Physical Applied Mathematics
Pure Mathematics

CAPSTONE EXPERIENCE 4
MATH 495  Independent Study

Total Hours 47

**
With permission from a departmental adviser, students may substitute another upper-division course from another unit.
Suggested Plan of Study

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 191</td>
<td>1</td>
<td>1 MATH 156 (GEF 8; B.S. Second Area 1)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 155 (GEF 3)</td>
<td>4</td>
<td>ENGL 101 (GEF 1)</td>
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<tr>
<td>GEF 2 (B.S. First Area 1)</td>
<td>4</td>
<td>GEF 6</td>
<td>3</td>
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<tr>
<td>GEF 4</td>
<td>3</td>
<td>3 B.S. First Area 2 (GEF 8)</td>
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<td>GEF 5</td>
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<td>1</td>
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Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 251 (B.S. Second Area 2)</td>
<td>4</td>
<td>MATH 261</td>
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<td>STAT 215</td>
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<td>MATH 303</td>
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<tr>
<td>ENGL 102 (GEF 1)</td>
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<tr>
<td>B.S. Third Area 1 (GEF 8)</td>
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<td>GEF 7</td>
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<td>General Elective</td>
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<td>General Elective</td>
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Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 343 or 441</td>
<td>3</td>
<td>MATH 322 or 420</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Mathematics 1st course</td>
<td>3</td>
<td>MATH 495</td>
<td>1</td>
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<tr>
<td>Advanced Mathematics 2nd Course</td>
<td>3</td>
<td>Advanced Mathematics 3rd course</td>
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<tr>
<td>SpeakWrite Course</td>
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<td>Advanced Mathematics 4th course</td>
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<td>General Elective</td>
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<tr>
<td>General Elective</td>
<td>2</td>
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Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 495</td>
<td>2</td>
<td>MATH 495</td>
<td>1</td>
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<tr>
<td>Advanced Mathematics 5th course</td>
<td>3</td>
<td>Advanced Mathematics 6th course</td>
<td>3</td>
</tr>
<tr>
<td>General Elective</td>
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<td>General Elective</td>
<td>4</td>
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<tr>
<td>General Elective</td>
<td>3</td>
<td>General Elective</td>
<td>4</td>
</tr>
<tr>
<td>General Elective</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>15</td>
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</tbody>
</table>

Total credit hours: 120

Areas of Emphasis Offered:

- Actuarial Science (p. 3)
- Computational Mathematical Science (p. 5)
- Mathematics Biology (p. 6)
- Mathematics Education (p. 7)
- Physical Applied Mathematics (p. 8)
- Pure Mathematics (p. 9)

Bachelor of Arts or Bachelor of Science in Mathematics: Actuarial Science Area of Emphasis

A mathematics degree with an emphasis in Actuarial Science provides the student with preparation necessary for becoming an actuary and passing the first two actuary exams. Coursework includes the study of compound interest models, valuation of financial instruments, forecasting and population trend analysis.

Actuarial Science Emphasis Requirements:
- **Capstone Requirement:** Students completing an Actuarial Science Area of Emphasis will focus their capstone on pricing models, premium analysis, and other aspects of financial mathematics.

- **Selecting Course:** If a course is selected as an option for the AoE, the same course may not be used to fulfill another MATH B.S. requirement.

**CURRICULUM REQUIREMENTS**

**CORE COURSES:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>MATH 363</td>
<td>Mathematical Foundations of Actuarial Science</td>
</tr>
<tr>
<td>MATH 364</td>
<td>Mathematics of Compound Interest</td>
</tr>
<tr>
<td>MATH 473</td>
<td>Actuarial Mathematics 1</td>
</tr>
<tr>
<td>MATH 474</td>
<td>Actuarial Mathematics 2</td>
</tr>
<tr>
<td>STAT 461</td>
<td>Introduction to Probability Theory</td>
</tr>
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</table>

**ELECTIVES:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 341</td>
<td>Introduction to Algebraic Structures</td>
</tr>
<tr>
<td>MATH 378</td>
<td>Discrete Mathematics</td>
</tr>
<tr>
<td>MATH 381</td>
<td>Introduction to Analysis and Topology</td>
</tr>
<tr>
<td>MATH 451</td>
<td>Introduction to Real Analysis 1</td>
</tr>
</tbody>
</table>

**Total Hours:** 18

**SUGGESTED PLAN OF STUDY FOR THE BACHELOR OF SCIENCE IN MATHEMATICS WITH AN AREA OF EMPHASIS IN ACTUARIAL SCIENCE**

**First Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 191</td>
<td></td>
<td>1 MATH 156 (GEF 8; B.S. Second Area 1)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 155 (GEF 3)</td>
<td>4</td>
<td>ENGL 101 (GEF 1)</td>
<td>3</td>
</tr>
<tr>
<td>GEF 2 (B.S. First Area 1)</td>
<td>4</td>
<td>GEF 6</td>
<td>3</td>
</tr>
<tr>
<td>GEF 4</td>
<td>3</td>
<td>B.S. First Area 2 (GEF 8)</td>
<td>4</td>
</tr>
<tr>
<td>GEF 5</td>
<td>3</td>
<td>General Elective</td>
<td>1</td>
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</tbody>
</table>

15         15

**Second Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 251</td>
<td>4</td>
<td>ENGL 102 (GEF 1)</td>
<td>3</td>
</tr>
<tr>
<td>B.S. Third Area 1 (GEF 8)</td>
<td>3</td>
<td>MATH 261</td>
<td>4</td>
</tr>
<tr>
<td>STAT 215</td>
<td>3</td>
<td>MATH 303</td>
<td>3</td>
</tr>
<tr>
<td>ECAS International Requirement (GEF 7)</td>
<td>4</td>
<td>STAT 461</td>
<td>3</td>
</tr>
<tr>
<td>General Elective</td>
<td>1</td>
<td>General Elective</td>
<td>2</td>
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</tbody>
</table>

15         15

**Third Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 364</td>
<td>3</td>
<td>MATH 322</td>
<td>3</td>
</tr>
<tr>
<td>Advanced Pure Math Elective</td>
<td>3</td>
<td>MATH 363</td>
<td>3</td>
</tr>
<tr>
<td>B.S. Third Area 2</td>
<td>4</td>
<td>MATH 495</td>
<td>1</td>
</tr>
<tr>
<td>SpeakWrite Course</td>
<td>3</td>
<td>General Elective</td>
<td>3</td>
</tr>
<tr>
<td>General Elective</td>
<td>2</td>
<td>General Elective</td>
<td>2</td>
</tr>
<tr>
<td>General Elective</td>
<td>3</td>
<td>General Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

15         15

**Fourth Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 473</td>
<td>3</td>
<td>MATH 474</td>
<td>3</td>
</tr>
<tr>
<td>MATH 495</td>
<td>2</td>
<td>MATH 495</td>
<td>1</td>
</tr>
<tr>
<td>General Elective</td>
<td>4</td>
<td>General Elective</td>
<td>3</td>
</tr>
<tr>
<td>General Elective</td>
<td>3</td>
<td>General Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

15         15
Bachelor of Science in Mathematics: Computational Mathematical Science Area of Emphasis

A mathematics degree with an emphasis in Computational Mathematical Science provides the student with necessary preparation for interdisciplinary positions in industry and graduate school in Applied Mathematics.

Computational Mathematical Science Emphasis Requirements:

- **Capstone Requirement**: Students completing a Computational Mathematical Science Area of Emphasis will focus their capstone on a topic that is connected or related to one of the upper-level proof courses.
- **Selecting Course**: If a course is selected as an option for the AoE, the same course may not be used to fulfill another MATH B.S. requirement.

**CURRICULUM REQUIREMENTS**

**CORE COURSES:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 378</td>
<td>Discrete Mathematics</td>
</tr>
<tr>
<td>MATH 373</td>
<td>Introduction to Cryptography</td>
</tr>
<tr>
<td>or MATH 377</td>
<td>Operations Research</td>
</tr>
</tbody>
</table>

**COMPUTATIONAL ELECTIVES:**

1-Select one course from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 363</td>
<td>Mathematical Foundations of Actuarial Science</td>
</tr>
<tr>
<td>MATH 456</td>
<td>Complex Variables</td>
</tr>
<tr>
<td>MATH 460</td>
<td>Introduction to Dynamical Systems and Applications</td>
</tr>
<tr>
<td>MATH 464</td>
<td>Deterministic Mathematical Modeling</td>
</tr>
<tr>
<td>MATH 465</td>
<td>Partial Differential Equations</td>
</tr>
</tbody>
</table>

2- Select one pair of courses and one additional course from the following list

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 320 &amp; CS 420</td>
<td>Analysis of Algorithms and Design of Algorithms</td>
</tr>
<tr>
<td>MATH 420 &amp; MATH 421</td>
<td>Numerical Analysis 1 and Numerical Analysis 2</td>
</tr>
<tr>
<td>STAT 312 or STAT 313</td>
<td>Intermediate Statistical Methods and Introductory Design and Analysis</td>
</tr>
<tr>
<td>STAT 461 &amp; STAT 462</td>
<td>Introduction to Probability Theory and Theoretical Introduction to Statistical Inference</td>
</tr>
</tbody>
</table>

**Total Hours: 18**

**SUGGESTED PLAN OF STUDY FOR THE BACHELOR OF SCIENCE IN MATHEMATICS WITH AN AREA OF EMPHASIS IN COMPUTATIONAL MATHEMATICAL SCIENCE**

**First Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 191</td>
<td>1 MATH 156</td>
<td>1 MATH 156 (GEF 8; B.S. Second Area 1)</td>
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<td>MATH 155 (GEF 3)</td>
<td>4 B.S. First Area 2 (GEF 8)</td>
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<td></td>
</tr>
<tr>
<td>GEF 2 (B.S. First Area 1)</td>
<td>4 ENGL 101 (GEF 1)</td>
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<tr>
<td>GEF 4</td>
<td>3 GEF 6</td>
<td>3 GEF 6</td>
<td>3</td>
</tr>
<tr>
<td>GEF 5</td>
<td>3 General Elective</td>
<td>3 General Elective</td>
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<td>15</td>
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</table>

**Second Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 251 (B.S. Second Area 2)</td>
<td>4 MATH 261</td>
<td>4 MATH 261</td>
<td>4</td>
</tr>
<tr>
<td>STAT 215</td>
<td>3 MATH 303</td>
<td>3 MATH 303</td>
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<tr>
<td>ENGL 102 (GEF 1)</td>
<td>3 B.S. Second Area 2</td>
<td>3 B.S. Second Area 2</td>
<td>4</td>
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</tbody>
</table>
Bachelor of Science in Mathematics: Mathematics Biology Area of Emphasis

A mathematics degree with an emphasis in Mathematics Biology provides the student with necessary preparation for both graduate school and industry positions with a focus on Biology and Mathematics interdisciplinary work.

**Mathematics Biology Emphasis Requirements:**

- **Capstone Requirement:** Students completing a Mathematics Biology Area of Emphasis will focus their capstone on a topic that is connected or related to one of the upper-level applied mathematics courses.
- **Selecting Course:** If a course is selected as an option for the AoE, the same course may not be used to fulfill another MATH B.S. requirement.

**CURRICULUM REQUIREMENTS**

**CORE COURSES:**

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<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<td>MATH 420</td>
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<tr>
<td>MATH 460</td>
<td>Introduction to Dynamical Systems and Applications</td>
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</tr>
<tr>
<td>MATH 470</td>
<td>Introduction to Mathematical and Computational Systems Biology</td>
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</tr>
<tr>
<td>MATH 471</td>
<td>Mathematical Systems Biology 2: Stochastic Methods</td>
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**ELECTIVES:**

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 341</td>
<td>Introduction to Algebraic Structures</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 378</td>
<td>Discrete Mathematics</td>
<td>1</td>
</tr>
<tr>
<td>or MATH 381</td>
<td>Introduction to Analysis and Topology</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 451</td>
<td>Introduction to Real Analysis 1</td>
<td>4</td>
</tr>
<tr>
<td>MATH 465</td>
<td>Partial Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 312</td>
<td>Intermediate Statistical Methods</td>
<td>3</td>
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</tbody>
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Total Hours: 18

**SUGGESTED PLAN OF STUDY FOR THE BACHELOR OF SCIENCE IN MATHEMATICS WITH AN AREA OF EMPHASIS IN MATHEMATICS BIOLOGY**

**First Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MATH 191</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MATH 155 (GEF 3)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>GEF 2 (B.S. First Area 1)</td>
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**Second Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 343</td>
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**Third Year**

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**Fourth Year**

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</table>

Total credit hours: 120
Bachelor of Science in Mathematics: Mathematics Education Area of Emphasis

A mathematics degree with an emphasis in Mathematics Education provides the student with necessary preparation to teach mathematics in middle and high school, or graduate school with an emphasis on teaching at the community college or higher education institution.

Mathematics Education Emphasis Requirements:

• **Capstone Requirement:** Students completing a Mathematics Education Area of Emphasis will focus their capstone on a topic that is connected or related to one of the upper-level applied mathematics courses.

• **Selecting Course:** If a course is selected as an option for the AoE, the same course may not be used to fulfill another MATH B.S. requirement.

**CURRICULUM REQUIREMENTS**

**CORE COURSES:**

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<tr>
<th>Course</th>
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<tr>
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<td>History of Mathematics</td>
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<tr>
<td>or MATH 318</td>
<td>Perspectives on Mathematics and Science</td>
</tr>
<tr>
<td>MATH 338</td>
<td>Geometry for Teachers</td>
</tr>
<tr>
<td>MATH 341</td>
<td>Introduction to Algebraic Structures</td>
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**ELECTIVES:**

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<td>MATH 376</td>
<td>Foundations, Functions and Regression Models</td>
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<tr>
<td>MATH 381</td>
<td>Introduction to Analysis and Topology</td>
</tr>
<tr>
<td>or MATH 451</td>
<td>Introduction to Real Analysis 1</td>
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**SUGGESTED PLAN OF STUDY FOR THE BACHELOR OF SCIENCE IN MATHEMATICS WITH AN AREA OF EMPHASIS IN MATHEMATICS EDUCATION**

### First Year

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<th>Fall</th>
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<th>Spring</th>
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<tbody>
<tr>
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<tr>
<td>MATH 155 (GEF 3)</td>
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<td>MATH 218 (GEF 5)</td>
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<td>GEF 2 (B.S. First Area 1)</td>
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<td>GEF 6</td>
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### Second Year

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<th>Hours</th>
<th>Spring</th>
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<tbody>
<tr>
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<td>MATH 261</td>
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<tr>
<td>STAT 215</td>
<td>3</td>
<td>MATH 303</td>
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<tr>
<td>ENGL 102 (GEF 1)</td>
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<td>MATH 338</td>
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### Third Year

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<th>Spring</th>
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<tbody>
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<td>Advanced Mathematics Course</td>
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### Fourth Year

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<th>Spring</th>
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<tbody>
<tr>
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<td>MATH 378</td>
<td>3</td>
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<td>MATH 495</td>
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</tbody>
</table>

Total credit hours: 120

**Bachelor of Science in Mathematics: Physical Applied Mathematics Area of Emphasis**

A mathematics degree with an emphasis in Physical Applied Mathematics provides the student with necessary preparation for interdisciplinary positions in industry or preparation for graduate school in Applied Mathematics.

**Physical Applied Mathematics Area Emphasis Requirements:**

- **Capstone Requirement**: Students completing a Physical Applied Mathematics Area of Emphasis will focus their capstone on a topic that is connected or related to one of the upper-level applied mathematics courses.

- **Selecting Course**: If a course is selected as an option for the AoE, the same course may not be used to fulfill another MATH B.S. requirement.

**CURRICULUM REQUIREMENTS**

**CORE COURSES:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>MATH 420</td>
<td>Numerical Analysis 1</td>
</tr>
<tr>
<td>MATH 460</td>
<td>Introduction to Dynamical Systems and Applications</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
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<tr>
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</tr>
<tr>
<td>MATH 456</td>
<td>Complex Variables</td>
</tr>
<tr>
<td>MATH 464</td>
<td>Deterministic Mathematical Modeling</td>
</tr>
<tr>
<td>MATH 465</td>
<td>Partial Differential Equations</td>
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**ELECTIVE:**

Select one course from the list:

- MATH 341: Introduction to Algebraic Structures
- MATH 378: Discrete Mathematics
- MATH 381: Introduction to Analysis and Topology
- MATH 451: Introduction to Real Analysis

**Total Hours:** 18

**SUGGESTED PLAN OF STUDY FOR THE BACHELOR OF SCIENCE IN MATHEMATICS WITH AN AREA OF EMPHASIS IN PHYSICAL APPLIED MATHEMATICS**

**First Year**

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<tbody>
<tr>
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<td>MATH 155 (GEF 3)</td>
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<tr>
<td>GEF 2 (B.S. First Area 1)</td>
<td>4</td>
<td>4 ENGL 101 (GEF 1)</td>
</tr>
<tr>
<td>GEF 4</td>
<td>3</td>
<td>3 GEF 6</td>
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**Second Year**

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<th>Semester</th>
<th>Fall Hours</th>
<th>Spring Hours</th>
</tr>
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<tbody>
<tr>
<td>MATH 251 (B.S. Second Area 2)</td>
<td>4</td>
<td>4 MATH 261</td>
</tr>
<tr>
<td>STAT 215</td>
<td>3</td>
<td>3 MATH 343</td>
</tr>
<tr>
<td>ENGL 102 (GEF 1)</td>
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<td>3 B.S. Second Area 2</td>
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<td>4 GEF 7</td>
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**Third Year**

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<th>Semester</th>
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<td>3 MATH 456</td>
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<td>3 MATH 420</td>
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<td>MATH 303</td>
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<td>3 MATH 495</td>
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<tr>
<td>SpeakWrite Course</td>
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<td>3 General Elective</td>
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**Fourth Year**

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</table>

**Total credit hours: 120**

**Bachelor of Science in Mathematics: Pure Mathematics Area of Emphasis**

A mathematics degree with an emphasis in Pure Mathematics provides the student with necessary preparation for graduate school in Mathematics for students that was to pursue a Masters or Doctoral degree in Mathematics. Coursework includes four or more upper-level proof classes in Real Analysis, Algebraic Structures, Topology, Discrete Mathematics, and Complex Variables.
Pure Mathematics Emphasis Requirements:

- **Capstone Requirement**: Students completing a Pure Mathematics Area of Emphasis will focus their capstone on a topic that is connected or related to one of the upper-level proof courses.
- **Selecting Course**: If a course is selected as an option for the AoE, the same course may not be used to fulfill another MATH B.S. requirement.

**CURRICULUM REQUIREMENTS**

**CORE COURSES:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MATH 341</td>
<td>Introduction to Algebraic Structures</td>
<td>3</td>
</tr>
<tr>
<td>MATH 381</td>
<td>Introduction to Analysis and Topology</td>
<td>3</td>
</tr>
<tr>
<td>MATH 451</td>
<td>Introduction to Real Analysis 1</td>
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<td>MATH 456</td>
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**ELECTIVES:**

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<th>Title</th>
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<tbody>
<tr>
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<tr>
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<td>Numerical Analysis 1</td>
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<td>or STAT 312</td>
<td>Intermediate Statistical Methods</td>
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<tr>
<td>or STAT 461</td>
<td>Introduction to Probability Theory</td>
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<tr>
<td>MATH 378</td>
<td>Discrete Mathematics</td>
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<tr>
<td>or MATH 442</td>
<td>Advanced Algebraic Structures</td>
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<tr>
<td>or MATH 452</td>
<td>Introduction to Real Analysis 2</td>
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Total Hours: 18

**SUGGESTED PLAN OF STUDY FOR THE BACHELOR OF SCIENCE IN MATHEMATICS WITH AN AREA OF EMPHASIS IN PURE MATHEMATICS**

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**Spring**

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**Second Year**

**Fall**

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<th>Course</th>
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<tbody>
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<td>ENGL 102</td>
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**Spring**

<table>
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**Third Year**

**Fall**

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<th>Course</th>
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<tbody>
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<td>MATH 343</td>
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<td>MATH 451</td>
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<td>SpeakWrite Course</td>
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**Spring**

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**Fourth Year**

**Fall**

<table>
<thead>
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<th>Course</th>
<th>Hours</th>
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<tbody>
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</tr>
<tr>
<td>MATH 495</td>
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15
Major Learning Outcomes

MATHEMATICS

Upon successful completion of the B.A. or B.S. degree, Mathematics majors will demonstrate the following competencies:

1. Students will communicate mathematics in both written and oral forms.
   - Students will construct valid proofs.
   - Students will demonstrate their ability to comprehend and to synthesize professional mathematical discourse (such as upper level textbooks, monographs, journal articles, unpublished faculty research, technical reports, etc.).
   - Students will prepare a clear and concise written project and orally present advanced mathematical concepts effectively and professionally.

2. Students will have a clear understanding of fundamental concepts and general understanding in a breadth of advanced topics in mathematics.
   - Students will demonstrate basic skills in specific mathematics topics (Algebra, Trigonometry, Calculus, Differential Equations, and Linear Algebra).
   - Students will demonstrate a breadth of knowledge of upper level mathematics topics.
   - Students will be exposed to the use of mathematics in various applications and professions.

3. Students will apply mathematical knowledge.
   - Students will demonstrate their ability to understand and construct mathematical models to solve problems.
   - Students will apply mathematics they have learned to new and different areas.