# Mathematics Undergraduate Major (BS, HBS)

This major offers the following option(s):

- Applied and Computational Mathematics ([link](http://catalog.oregonstate.edu/college-departments/science/mathematics/mathematics-bs-hbs/applied-computational-mathematics-option/))
- Mathematical Biology ([link](http://catalog.oregonstate.edu/college-departments/science/mathematics/mathematics-bs-hbs/mathematical-biology-option/))
- Secondary Teaching Emphasis ([link](http://catalog.oregonstate.edu/college-departments/science/mathematics/mathematics-bs-hbs/secondary-teaching-emphasis-option/))
- Statistics ([link](http://catalog.oregonstate.edu/college-departments/science/mathematics/mathematics-bs-hbs/statistics-option/))

The BS degree in Mathematics requires a common core of courses at the lower-division level and junior-level followed by senior-level depth and breadth requirements. The upper-division requirements in the major total 45–50 credits. Thus, a mathematics major has ample opportunity to take further mathematics courses focused toward specific interests and career goals. Programs supporting interdisciplinary interests are strongly encouraged.

## Major Code: 560

- Demonstrate mathematical reasoning skills by reading, writing, and explaining formal definitions, theorems, and proofs.
- Analyze mathematical problems by applying the theory and techniques from a variety of mathematical perspectives.
- Use computational technology to support problem solving and mathematical understanding.
- Use mathematical concepts and techniques to recognize, formulate and analyze questions from another discipline.
- Communicate mathematics effectively.

The following requirements are specific to the BS degree in Mathematics. Students must also satisfy OSU degree and baccalaureate core requirements.

A grade of at least C– and a GPA of 2.25 are required in all mathematics courses used to fulfill degree requirements. No course used to fulfill requirements for the mathematics major or any of its options may be taken S/U.

**Required Mathematics Core Classes**

### Lower-Division Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 251</td>
<td><em>Differential Calculus</em></td>
<td>4</td>
</tr>
<tr>
<td>MTH 252</td>
<td>Integral Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MTH 253</td>
<td>Infinite Series and Sequences</td>
<td>4</td>
</tr>
<tr>
<td>MTH 254</td>
<td>Vector Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MTH 255</td>
<td>Vector Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MTH 256</td>
<td>Applied Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>PH 211</td>
<td>*General Physics with Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

### Upper-Division Requirements:

#### Part A. Required Mathematics Core Classes

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 311</td>
<td>Advanced Calculus I</td>
<td></td>
</tr>
<tr>
<td>&amp; MTH 312</td>
<td>and Advanced Calculus II</td>
<td></td>
</tr>
<tr>
<td>MTH 341</td>
<td>Linear Algebra I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 342</td>
<td>Linear Algebra II</td>
<td>4</td>
</tr>
<tr>
<td>MTH 343</td>
<td>Introduction to Modern Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MTH 355</td>
<td>Discrete Mathematics</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following writing intensive courses (WIC):

- MTH 323 *Mathematical Modeling* (WIC)
- MTH 333 *Fundamental Concepts of Topology* (WIC)
- MTH 338 *Non-Euclidean Geometry* (WIC)

#### Part B: Computational Requirement

Select one of the following (can be used to satisfy one requirement in either Part C or Part D):

- MTH 321 Introductory Applications of Mathematical Software
- MTH 351 Introduction to Numerical Analysis
- MTH 440 Computational Number Theory
- MTH 441 Applied and Computational Algebra
- MTH 451 Numerical Linear Algebra
- MTH 452 Numerical Solution of Ordinary Differential Equations

#### Part C: Area Course Work

Select 15 credits from the following six areas:

- **Algebra and Number Theory**
  - MTH 440 Computational Number Theory
  - MTH 441 Applied and Computational Algebra
  - MTH 442 Applied and Computational Algebra
  - MTH 443 Abstract Linear Algebra (cannot be used in a pair to satisfy (a))

- **Analysis**
  - MTH 411 Real Analysis
  - MTH 419 Multivariable Advanced Calculus
  - MTH 483 Complex Variables (cannot be used in a pair to satisfy (a))

- **Applied Mathematics**
  - MTH 420 Models and Methods of Applied Mathematics
  - MTH 427 Introduction to Mathematical Biology
  - MTH 428 Stochastic Elements in Mathematical Biology
  - MTH 480 Systems of Ordinary Differential Equations
  - MTH 481 Applied Ordinary Differential Equations
  - MTH 482 Applied Partial Differential Equations

- **Geometry and Topology**
  - MTH 430 Metric Spaces and Topology
  - MTH 434 Introduction to Differential Geometry
  - MTH 435 Differential Geometry
  - MTH 437 General Relativity

- **Numerical Analysis**
  - MTH 451 Numerical Linear Algebra
  - MTH 452 Numerical Solution of Ordinary Differential Equations
  - MTH 453 Numerical Solution of Partial Differential Equations

- **Probability**
  - MTH 463 Probability I
  - MTH 464 Probability II
  - MTH 465 Probability III
  - MTH 467 Actuarial Mathematics

#### Part D: Electives

Select two additional upper division electives of a mathematical nature

**Total credits required for graduation**: 180
Mathematics Undergraduate Major (BS, HBS)

Mathematics courses at the 400 level are offered in the 6 areas listed. Five 400-level classes satisfying (a) and (b) are required.

(a) **Depth requirement**: A pair of classes from one of the 6 areas is required. Some exceptions are noted.

(b) **Breadth requirement**: One course each from 3 of the 5 remaining areas.

This includes non-blanket numbered (not X99- or X0X-numbered) upper-division MTH courses, upper-division ST courses, or other courses of a mathematical nature approved by the departmental head advisor. MTH 390 is not allowed.

MTH 480 and MTH 481 cannot both be used to satisfy program requirements

* Baccalaureate Core Course (BCC)

^ Writing Intensive Course (WIC)

**Major Code: 560**