

# MATHEMATICS (BS)

## Exploration and Discovery

The mathematics major delivers a balanced survey of classical and modern math. Computational courses begin with calculus and culminate in mathematical and statistical modeling. Theoretical courses begin with proof writing and culminate in abstract algebra and real analysis. Collaboration, communication, and perseverance are emphasized throughout the major. Upon completion of the program, students are prepared for a large variety of careers, as they are trained creative problem solvers.

## Degree Requirements

| Course  | Title   | Credits |
|---|---|---------|
| Major Requirements  |   |         |
| MA 2450   | Mathematical Reasoning                            | 4       |
| MA 2550   | Calculus I (QRCO)                                 | 4       |
| MA 2560   | Calculus II (QRCO)                                | 4       |
| MA 2700   | Introduction to Mathematical Proof Writing (WRCO) | 3       |
| MA 3500   | Probability and Statistics for Scientists         | 3       |
| MA 3540   | Calculus III                                      | 4       |
| MA 3600   | Differential Equations with Linear Algebra        | 4       |
| MA 4110   | Mathematical Expositions                          | 3       |
| MA 4140   | Abstract Algebra (WRCO)                           | 3       |
| MA 4510   | Introduction to Analysis                          | 3       |
| Mathematics Electives: Additional Mathematics Courses at 3000 or higher (minimum 6 credits)   |   |         |
| Computer Science Electives - Complete two courses:  |   | 5-7     |
| CS 2010   | Computing Fundamentals (TECO)                     |         |
| CS 2370   | Introduction to Programming                       |         |
| CS 2400   |   |         |
| CS 2470   | Systems Programming in C/C++                      |         |
| General Education ( <a href="https://coursecatalog.plymouth.edu/general-education/">https://coursecatalog.plymouth.edu/general-education/</a> ) |   |         |
| EN 1400   | Composition                                       | 4       |
| IS 1115   | Tackling a Wicked Problem                         | 4       |
| CTDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#CTDI">https://coursecatalog.plymouth.edu/general-education/#CTDI</a> )    | Creative Thought Direction                        | 3-4     |
| PPDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#PPDI">https://coursecatalog.plymouth.edu/general-education/#PPDI</a> )    | Past and Present Direction                        | 3-4     |
| SIDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#SIDI">https://coursecatalog.plymouth.edu/general-education/#SIDI</a> )    | Scientific Inquiry Direction                      | 3-4     |
| SSDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#SSDI">https://coursecatalog.plymouth.edu/general-education/#SSDI</a> )    | Self and Society Direction                        | 3-4     |

|  |            |
|--|------------|
| Directions (choose from CTDI, PPDI, SIDI, SSDI) ( <a href="https://coursecatalog.plymouth.edu/general-education/">https://coursecatalog.plymouth.edu/general-education/</a> ) <sup>1</sup> | 4-8        |
| DICO ( <a href="https://coursecatalog.plymouth.edu/general-education/#DICO">https://coursecatalog.plymouth.edu/general-education/#DICO</a> )   | 3-4        |
| GACO ( <a href="https://coursecatalog.plymouth.edu/general-education/#GACO">https://coursecatalog.plymouth.edu/general-education/#GACO</a> )   | 3-4        |
| INCP ( <a href="https://coursecatalog.plymouth.edu/general-education/#INCP">https://coursecatalog.plymouth.edu/general-education/#INCP</a> )   | 3-4        |
| WECO ( <a href="https://coursecatalog.plymouth.edu/general-education/#WECO">https://coursecatalog.plymouth.edu/general-education/#WECO</a> )   | 3-4        |
| Electives  | 28-34      |
| <b>Total Credits</b>   | <b>120</b> |

<sup>1</sup> Directions should total 20 credits (unless the major has a waiver for a specific Direction).

## Recommended Course Sequence

Check all course descriptions for prerequisites before planning course schedule. Course sequence is suggested but not required.

To complete the bachelor's degree in 4 years, you must successfully complete a minimum of 15 credits each semester or have a plan to make up credits over the course of the 4 years. For example, if you take 14 credits one semester, you need to take 16 credits in another semester. Credits completed must count toward your program requirements (major, option, minor, certificate, general education or free electives).

### BS Mathematics

Check all course descriptions for prerequisites before planning course schedule. Course sequence is suggested but not required.

| Course   | Title   | Credits      |
|--|---|--------------|
| <b>Year One</b>  |   |              |
| <b>Fall</b>  |   |              |
| MA 2450  | Mathematical Reasoning                            | 4            |
| MA 2550  | Calculus I (QRCO)                                 | 4            |
| IS 1115  | Tackling a Wicked Problem                         | 4            |
| CTDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#CTDI">https://coursecatalog.plymouth.edu/general-education/#CTDI</a> ) | Creative Thought Direction                        | 3-4          |
| <b>Credits</b>   |   | <b>15-16</b> |
| <b>Spring</b>  |   |              |
| MA 2700  | Introduction to Mathematical Proof Writing (WRCO) | 3            |

|   |  |     |
|---|--|-----|
| MA 2560<br>or MA 2550   | Calculus II (QRCO)<br>or Calculus I (QRCO) | 4   |
| EN 1400   | Composition                                | 4   |
| PPDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#PPDI">https://<br/>coursecatalog.plymouth.edu/<br/>general-education/<br/>#PPDI</a> ) | Past and Present Direction                 | 3-4 |

**Credits 14-15**

#### Year Two

##### Fall

|   |  |     |
|---|--|-----|
| MA 3600   | Differential Equations with Linear Algebra | 4   |
| SSDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#SSDI">https://<br/>coursecatalog.plymouth.edu/<br/>general-education/<br/>#SSDI</a> ) | Self and Society Direction                 | 3-4 |
| DICO ( <a href="https://coursecatalog.plymouth.edu/general-education/#DICO">https://<br/>coursecatalog.plymouth.edu/<br/>general-education/<br/>#DICO</a> ) | Diversity Connection                       | 3-4 |
| Elective  |  | 3   |

**Credits 13-15**

##### Spring

|   |                              |     |
|---|------------------------------|-----|
| MA 3540   | Calculus III                 | 4   |
| Computer Science Elective   |                              | 3   |
| SIDI ( <a href="https://coursecatalog.plymouth.edu/general-education/#SIDI">https://<br/>coursecatalog.plymouth.edu/<br/>general-education/<br/>#SIDI</a> ) | Scientific Inquiry Direction | 3-4 |
| Elective  |                              | 3-4 |

**Credits 13-15**

#### Year Three

##### Fall

|  |  |     |
|--|--|-----|
| MA 3500  | Probability and Statistics for Scientists    | 3   |
| MA 3355  | Introduction to Mathematical Modeling (TECO) | 4   |
| Directions (choose from CTDI, PPDI, SIDI, SSDI) ( <a href="https://coursecatalog.plymouth.edu/general-education/">https://<br/>coursecatalog.plymouth.edu/general-education/</a> ) |  | 4-8 |
| Computer Science Elective  |  | 3   |
| Elective   |  | 3-4 |

**Credits 17-22**

##### Spring

|   |                             |     |
|---|-----------------------------|-----|
| MA 4140   | Abstract Algebra (WRCO)     | 3   |
| Upper Level Mathematics Elective  |                             | 3-4 |
| GACO ( <a href="https://coursecatalog.plymouth.edu/general-education/#GACO">https://<br/>coursecatalog.plymouth.edu/<br/>general-education/<br/>#GACO</a> ) | Global Awareness Connection | 3-4 |
| Electives   |                             | 3-4 |

**Credits 12-15**

#### Year Four

##### Fall

|         |                          |   |
|---------|--------------------------|---|
| MA 4510 | Introduction to Analysis | 3 |
|---------|--------------------------|---|

|   |                     |     |
|---|---------------------|-----|
| INCP ( <a href="https://coursecatalog.plymouth.edu/general-education/#INCP">https://<br/>coursecatalog.plymouth.edu/<br/>general-education/<br/>#INCP</a> ) | Integrated Capstone | 3-4 |
|---|---------------------|-----|

**Electives 9**

**Credits 15-16**

##### Spring

|   |                          |      |
|---|--------------------------|------|
| MA 4110   | Mathematical Expositions | 3    |
| WECO ( <a href="https://coursecatalog.plymouth.edu/general-education/#WECO">https://<br/>coursecatalog.plymouth.edu/<br/>general-education/<br/>#WECO</a> ) | Wellness Connection      | 3-4  |
| Electives   |                          | 9-10 |
| Upper Level Mathematics Elective  |                          | 3-4  |

**Credits 18-21**

**Total Credits 120**

<sup>1</sup> Required for the Option

<sup>2</sup> Directions should total 20 credits (unless the major has a waiver for a specific Direction).

## Learning Outcomes

- The ability to communicate mathematics.
- Facility with technology.
- The ability to understand proofs.
- The understanding of mathematical structures, their properties, and their applications.
- Knowledge of the historical and cultural development of mathematical systems.

## Career Pathways

A major in mathematics is a good preparation for a variety of careers, especially careers that require the ability to reason carefully and express oneself clearly. Many mathematicians have job titles that do not directly reference the relevant math skills (see list below). Plymouth State's mathematics program provides student with sufficient background in theory and practice so they may pursue graduate work, research, teaching in the secondary schools, and various types of industry.

**Sample Jobs include, but are not limited to:** Mathematical Scientist, Actuary, Teacher, Engineer, Game Designer, Supply Chain Analyst, Retirement Plan Designer, Numerical Analyst, Financial Planner, Data Base Manager, Cryptologist, Forensic Analyst, Computer Research Scientist, Physician, Information Scientist, Bioinformatician, Quality Control Analyst, Economist, Information Systems Analyst, Robotics Engineer, Cost Estimator, Epidemiologist, Software Engineer, Risk Analyst, Claims Specialist, Controller, Quantitative Pharmacologist, Forecast Analyst, Environmental Scientist, Data Engineer, Auditor, Budget Analyst, Systems Modeler, Methods Developer, Scientific Consultant, Underwriter, Geomagnetic Engineer, Forest/Fisheries Scientist, Mathematical Biologist, Modeler

See the U.S. Department of Labor Outlook for a complete list.

### Useful Skills for Jobs in the Mathematics Fields:

- Accuracy and attention to detail
- Proficiency in analytical reasoning

- Ability to analyze problems and make appropriate decisions
- Ability to organize and memorize detailed information
- Strong organization skills