# MATHEMATICS B.A. - APPLIED MATHEMATICS

This degree concentration differs from the BA in Mathematics without a concentration only in the Concentration Requirements.

## General Degree Requirements

To earn a baccalaureate degree, all students must complete successfully, in addition to any other requirements, the University of Montana General Education Requirements. Please refer to the General Education Requirements page (https://catalog.umt.edu/academics/general-education-requirements/) for more information.

Additional requirements for graduation can be found on the Degree/Certificate Requirements for Graduation page (https://catalog.umt.edu/academics/graduation-requirements/).

Unless otherwise noted in individual program requirements, a minimum grade point average of 2.00 in all work attempted at the University of Montana-Missoula is required for graduation. Please see the Academic Policies and Procedures page (https://catalog.umt.edu/academics/policies-procedures/) for information on how your GPA is calculated.

Courses taken to satisfy the requirements of a major, minor, or certificate program must be completed with a grade of C- or better unless a higher grade is noted in the program requirements.

## Bachelor of Arts - Mathematics; Applied Mathematics Concentration

### Credit Requirements

The major specific credits are much lower for double-majors and for students completing a minor in another subject:

- 42 credits for students completing a second major, and
- 46 credits for students completing a minor.

### GPA Requirement

- A cumulative GPA of 2.0 is required for all courses used to fulfill major requirements.
- In addition, a cumulative GPA of 2.0 is required for all mathematical sciences courses used to fulfill major requirements. (Mathematical sciences courses are those with a prefix of M or STAT.)

### Course Requirements

| Code | Title | Hours |
|---|---|---|
| **Core Courses** | | |
| Complete all of the following courses: | | |
| M 171 | Calculus I | 4 |
| or M 181 | Honors Calculus I | |
| M 172 | Calculus II | 4 |
| or M 182 | Honors Calculus II | |
| M 210 | Introduction to Mathematical Software | 3 |
| M 221 | Introduction to Linear Algebra | 4 |
| M 273 | Multivariable Calculus | 4 |
| M 300 | Undergraduate Mathematics Seminar | 1 |
| M 307 | Introduction to Abstract Mathematics | 3 |
| **Electives** [1] | | |
| Complete 18-23 credits (6-7 courses) of the following courses. At least three courses must be at the 400 level. See note below about the elective credit requirement. | | 18-23 |
| M 274 | Introduction to Differential Equations | |
| M 301 | Teaching Mathematics with Technology | |
| M 325 | Discrete Mathematics | |
| M 326 | Number Theory | |
| M 361 | Discrete Optimization | |
| M 362 | Linear Optimization | |
| M 381 | Advanced Calculus I | |
| M 412 | Partial Differential Equations | |
| M 414 | Deterministic Models | |
| M 429 | History of Mathematics [2] | |
| M 431 | Abstract Algebra I | |
| M 432 | Abstract Algebra II | |
| M 439 | Euclidean and NonEuclidean Geometry | |
| M 440 | Numerical Analysis | |
| M 445 | Statistical, Dynamical, and Computational Modeling | |
| M 461 | Data Science Analytics | |
| M 462 | Theoretical Basics of Big Data Analytics and Real Time Computation Algorithms | |
| M 472 | Introduction to Complex Analysis | |
| M 473 | Introduction to Real Analysis | |
| M 485 | Graph Theory | |
| STAT 342 | Probability and Simulation | |
| STAT 421 | Probability Theory | |
| STAT 422 | Mathematical Statistics | |
| STAT 452 | Statistical Methods II | |
| **Science Requirement** [3] | | |
| Complete 18 credits in at most 3 areas selected from astronomy (ASTR), biology (BIO*), chemistry (CHMY), computer science (CSCI, except CSCI TR*), economics (ECNS), forestry (FORS, WILD), geosciences (GEO), management information systems (BMIS), and physics (PHSX). | | 18 |
| **Language/Computer Science Requirement** [4] | | |
| Complete either the General Education Language Requirement or complete one of the following courses: | | 3 |
| CSCI 150 | Introduction to Computer Science | |
| CSCI 151 | Interdisciplinary Computer Science I | |
| CSCI 152 | Interdisciplinary Computer Science II | |
| **Applied Mathematics Concentration** | | |
| These courses count toward the mathematics electives requirement | | |
| **Applied Mathematics Concentration Core Courses** | | |
| Complete all of the following courses: | | |
| M 274 | Introduction to Differential Equations | |
| M 412 | Partial Differential Equations | |
| **Applied Mathematics Concentration Elective Courses** [5] | | |
| Complete two of the following courses: | | |
| M 414 | Deterministic Models | |
| M 440 | Numerical Analysis | |

| | | |
|---|---|---|
| | M 445 | Statistical, Dynamical, and Computational Modeling |
| | M 472 | Introduction to Complex Analysis |
| **Total Hours** | | **62-67** |

1 Students completing a second major need take only 18 credits. Students completing a minor in another subject need take only 20 credits. All other students must complete 23 credits and 7 courses. At least 4 of the courses in this category must be taken at UM-Missoula (only 3 if M 307 is taken at UM-Missoula).

2 M 429 is also an advanced college writing course. Most Mathematics majors use M 429 to meet the advanced college writing general education requirement.

3 Students completing a minor in another subject or a second major are exempt from this requirement. Transfer courses listed on the transcript as CSCI TR* may include course work in other areas such as Computer Applications (CAPP) and therefore do not count towards this requirement unless a student successfully petitions the Department of Mathematical Sciences.

4 Students completing a second major are exempt from this requirement.

5 In addition, M 381 and M 485 are also recommended.

| Code | Title | Hours |
|---|---|---|
| **Elective Computer Labs and Independent Study Courses** | | |
| Computer labs and independent study courses from the following list are optional; if taken (0-2 credits), they count toward the total number of credits required for the Mathematics Elective requirement. | | |
| M 363 | Linear Optimization Laboratory | |
| M 392 | Independent Study | |
| M 492 | Independent Study | |
| STAT 457 | Computer Data Analysis I | |
| STAT 458 | Computer Data Analysis II | |