

# MATHEMATICS, B.S.

Mathematics bridges the humanities and the sciences. Its position among the humanities is based on the study of mathematics as one of the liberal arts for more than two thousand years. The natural sciences have invariably turned to mathematics for techniques needed to explore the consequences of scientific theories. In the last few decades social scientists have increasingly found higher mathematics of value in their training and research. Still an expanding subject, mathematics is a part of more new and challenging frontiers than at any time in its long history—with many new fields, from data science to quantum computing, requiring new techniques and inspiring ideas for exploration.

Graduating math majors have obtained employment in a variety of jobs in business, industry, and governmental agencies and also have obtained teaching positions at the secondary school level (such teaching positions normally require teaching certification). Others have continued their education at the graduate level in mathematics and other fields. Departments in a variety of fields which use mathematics, including some in the social and biological sciences as well as in engineering and the physical sciences, are interested in attracting math majors into their graduate programs. Math Ph.D.'s obtain academic positions at the college and university level and nonacademic positions entailing consulting and research. The math major requirements are flexible enough to allow preparation for various goals, interests, and careers.

Students interested in mathematics might also consider the related degree program in applied mathematics, engineering and physics (<http://guide.wisc.edu/undergraduate/letters-science/mathematics/applied-mathematics-engineering-physics-bs-amep/>).

## HOW TO GET IN

### DECLARATION

To declare a major in mathematics, a student must have completed the sequence MATH 221, MATH 222, and MATH 234, or the sequence MATH 375 and MATH 376, with a 2.500 GPA or better. Major advisors may waive this requirement for students with alternative coursework and experiences (e.g., transfer students). Students should meet with a math advisor before declaring in order to discuss course selection and major plan. Advising information can be found in the Advising and Careers (<https://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-bs/#advisingandcareerstext>) link.

## REQUIREMENTS

### UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate

General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the *Guide*.

|                   |  |
|-------------------|--|
| General Education | <ul style="list-style-type: none"> <li>• Breadth—Humanities/Literature/Arts: 6 credits</li> <li>• Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits</li> <li>• Breadth—Social Studies: 3 credits</li> <li>• Communication Part A &amp; Part B *</li> <li>• Ethnic Studies *</li> <li>• Quantitative Reasoning Part A &amp; Part B *</li> </ul> |
|-------------------|--|

\* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

## COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF SCIENCE (B.S.)

Students pursuing a Bachelor of Science degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either the Bachelor of Arts or the Bachelor of Science degree requirements.

### BACHELOR OF SCIENCE DEGREE REQUIREMENTS

**Mathematics** Complete two courses of 3+ credits at the Intermediate or Advanced level in MATH, COMP SCI, or STAT subjects. A maximum of one course in each of COMP SCI and STAT subjects counts toward this requirement.

**Foreign Language** Complete the third unit of a foreign language.

**L&S Breadth** Complete:

- 12 credits of Humanities, which must include at least 6 credits of Literature; and
- 12 credits of Social Science; and
- 12 credits of Natural Science, which must include 6 credits of Biological Science and 6 credits of Physical Science.

**Liberal Arts and Science Coursework** Complete at least 108 credits.

**Depth of Intermediate/Advanced Coursework** Complete at least 60 credits at the Intermediate or Advanced level.

**Major** Declare and complete at least one major.

**Total Credits** Complete at least 120 credits.

**UW-Madison Experience** Complete both:

- 30 credits in residence, overall, and
- 30 credits in residence after the 86th credit.

**Quality of Work**

- 2.000 in all coursework at UW–Madison
- 2.000 in Intermediate/Advanced level coursework at UW–Madison

## NON-L&S STUDENTS PURSUING AN L&S MAJOR

Non-L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

The mathematics major requirements include exposure to at least two areas of advanced mathematics. The program is ideal for any student who has a broad interest in mathematics both pure and applied, and functions well as a standalone or complementary program.

The mathematics major requires 7 distinct courses for at least 21 credits as described below. Note that at most one course from each of the following groupings may be used to fulfill the minimum course and credit requirement (i.e.: seven courses and at least 21 credits): Intro Linear Algebra (MATH 320, MATH 340, MATH 341, MATH 375), Intro Differential Equations (MATH 319, MATH 320, or MATH 376), and Intro Probability (MATH/STAT 309, MATH 331, or MATH/STAT 431).

## MATHEMATICS MAJOR REQUIREMENTS

**At least seven MATH courses for at least 21 credits are required for the major as follows<sup>1</sup>:**

| Code   | Title  | Credits    |
|--|--|------------|
| <b>Linear Algebra (complete one)<sup>2</sup></b> |  | <b>3-5</b> |
| MATH 341   | Linear Algebra                                       |            |
| or MATH 320                                      | Linear Algebra and Differential Equations            |            |
| or MATH 340                                      | Elementary Matrix and Linear Algebra                 |            |
| or MATH 375                                      | Topics in Multi-Variable Calculus and Linear Algebra |            |

| Code  | Title               | Credits  |
|---|---------------------|----------|
| <b>Analysis, Topology, Algebra (complete two)</b> |                     | <b>6</b> |
| MATH 521  | Analysis I          |          |
| MATH 541  | Modern Algebra      |          |
| MATH 551  | Elementary Topology |          |

### Advanced MATH Elective (complete one)

| Code  | Title                                | Credits  |
|---|--------------------------------------|----------|
| <b>Complete at least one for three credits:</b> |                                      | <b>3</b> |
| MATH/<br>COMP SCI 513                           | Numerical Linear Algebra             |          |
| MATH/<br>COMP SCI 514                           | Numerical Analysis                   |          |
| MATH 519  | Ordinary Differential Equations      |          |
| MATH 521  | Analysis I                           |          |
| MATH 522  | Analysis II                          |          |
| MATH/<br>COMP SCI/ISYE/<br>STAT 525             | Linear Optimization                  |          |
| MATH 531  | Probability Theory                   |          |
| MATH 535  | Mathematical Methods in Data Science |          |
| MATH 540  | Linear Algebra II                    |          |
| MATH 541  | Modern Algebra                       |          |
| MATH 542  | Modern Algebra                       |          |
| MATH 551  | Elementary Topology                  |          |

|   |  |
|---|--|
| MATH 552                                | Elementary Geometric and Algebraic Topology                |
| MATH 561                                | Differential Geometry                                      |
| MATH 567                                | Modern Number Theory                                       |
| MATH 570                                | Fundamentals of Set Theory                                 |
| MATH/<br>PHILOS 571                     | Mathematical Logic   |
| MATH 605                                | Stochastic Methods for Biology                             |
| MATH 607                                | Topics in Mathematics Study Abroad                         |
| MATH/B M I/<br>BIOCHEM/<br>BMOLCHEM 609 | Mathematical Methods for Systems Biology                   |
| MATH 619                                | Analysis of Partial Differential Equations                 |
| MATH 621                                | Introduction to Manifolds                                  |
| MATH 623                                | Complex Analysis   |
| MATH 627                                | Introduction to Fourier Analysis                           |
| MATH 629                                | Introduction to Measure and Integration                    |
| MATH/ISYE/<br>OTM/STAT 632              | Introduction to Stochastic Processes                       |
| MATH 635                                | An Introduction to Brownian Motion and Stochastic Calculus |
| MATH/ECE 641                            | Introduction to Error-Correcting Codes                     |
| MATH 681                                | Senior Honors Thesis                                       |
| MATH 682                                | Senior Honors Thesis                                       |
| MATH 691                                | Undergraduate Thesis                                       |
| MATH 692                                | Undergraduate Thesis                                       |
| MATH 698                                | Directed Study   |
| MATH 699                                | Directed Study   |

### Additional MATH Elective to achieve 7 courses and 21 credits in the major

| Code                              | Title  | Credits  |
|-----------------------------------|--|----------|
| <b>Choose from the following:</b> |  | <b>9</b> |
| MATH/STAT 309                     | Introduction to Probability and Mathematical Statistics I <sup>3</sup> |          |
| or MATH 331                       | Introductory Probability   |          |
| or MATH/<br>STAT 431              | Introduction to the Theory of Probability                              |          |
| MATH/STAT 310                     | Introduction to Probability and Mathematical Statistics II             |          |
| MATH 319                          | Techniques in Ordinary Differential Equations <sup>4</sup>             |          |
| or MATH 376                       | Topics in Multi-Variable Calculus and Differential Equations           |          |
| MATH 321                          | Applied Mathematical Analysis  |          |
| MATH 322                          | Applied Mathematical Analysis  |          |
| MATH 390                          | Undergraduate Research with Madison Experimental Mathematics Lab       |          |
| MATH 407                          | Topics in Mathematics Study Abroad                                     |          |
| MATH 415                          | Applied Dynamical Systems, Chaos and Modeling                          |          |

|   |   |
|---|---|
| MATH 421                                | The Theory of Single Variable Calculus      |
| MATH/<br>COMP SCI/<br>I SY E 425        | Introduction to Combinatorial Optimization  |
| MATH/<br>COMP SCI/<br>E C E 435         | Introduction to Cryptography                |
| MATH 441                                | Introduction to Modern Algebra              |
| MATH 443                                | Applied Linear Algebra                      |
| MATH 461                                | College Geometry I                          |
| MATH 467                                | Introduction to Number Theory               |
| MATH/<br>HIST SCI 473                   | History of Mathematics                      |
| MATH/<br>COMP SCI/<br>STAT 475          | Introduction to Combinatorics               |
| MATH 490                                | Undergraduate Seminar                       |
| MATH 491                                | Topics in Undergraduate Mathematics         |
| MATH/<br>COMP SCI 513                   | Numerical Linear Algebra                    |
| MATH/<br>COMP SCI 514                   | Numerical Analysis                          |
| MATH 519                                | Ordinary Differential Equations             |
| MATH 521                                | Analysis I                                  |
| MATH 522                                | Analysis II                                 |
| MATH/<br>COMP SCI/I SY E/<br>STAT 525   | Linear Optimization                         |
| MATH 531                                | Probability Theory                          |
| MATH 535                                | Mathematical Methods in Data Science        |
| MATH 540                                | Linear Algebra II                           |
| MATH 541                                | Modern Algebra                              |
| MATH 542                                | Modern Algebra                              |
| MATH 551                                | Elementary Topology                         |
| MATH 552                                | Elementary Geometric and Algebraic Topology |
| MATH 561                                | Differential Geometry                       |
| MATH 567                                | Modern Number Theory                        |
| MATH 570                                | Fundamentals of Set Theory                  |
| MATH/<br>PHILOS 571                     | Mathematical Logic                          |
| MATH 605                                | Stochastic Methods for Biology              |
| MATH 607                                | Topics in Mathematics Study Abroad          |
| MATH/B M I/<br>BIOCHEM/<br>BMOLCHEM 609 | Mathematical Methods for Systems Biology    |
| MATH 619                                | Analysis of Partial Differential Equations  |
| MATH 621                                | Introduction to Manifolds                   |
| MATH 623                                | Complex Analysis                            |
| MATH 627                                | Introduction to Fourier Analysis            |

|                              |  |
|------------------------------|--|
| MATH 629                     | Introduction to Measure and Integration                    |
| MATH/I SY E/<br>OTM/STAT 632 | Introduction to Stochastic Processes                       |
| MATH 635                     | An Introduction to Brownian Motion and Stochastic Calculus |
| MATH/E C E 641               | Introduction to Error-Correcting Codes                     |
| MATH 681                     | Senior Honors Thesis                                       |
| MATH 682                     | Senior Honors Thesis                                       |
| MATH 691                     | Undergraduate Thesis                                       |
| MATH 692                     | Undergraduate Thesis                                       |
| MATH 698                     | Directed Study   |
| MATH 699                     | Directed Study   |

**Total Credits** **9**

## RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in all MATH and major courses.
- 2.000 GPA on 15 upper-level major credits, taken in residence.<sup>5</sup>
- 15 credits in MATH, taken on the UW-Madison campus.

## NAMED OPTIONS

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- MATHEMATICS: MATHEMATICS FOR DATA SCIENCE ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-DATA-SCIENCE-BA/](http://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-ba/mathematics-mathematics-data-science-ba/))
- MATHEMATICS: MATHEMATICS FOR ECONOMICS AND FINANCE ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-ECONOMICS-FINANCE-BA/](http://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-ba/mathematics-mathematics-economics-finance-ba/))
- MATHEMATICS: MATHEMATICS FOR PROGRAMMING AND COMPUTING ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-PROGRAMMING-COMPUTING-BA/](http://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-ba/mathematics-mathematics-programming-computing-ba/))
- MATHEMATICS: MATHEMATICS FOR SECONDARY EDUCATION ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-SECONDARY-EDUCATION-BA/](http://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-ba/mathematics-mathematics-secondary-education-ba/))
- MATHEMATICS: MATHEMATICS FOR STATISTICAL ANALYSIS AND RISK ASSESSMENT ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-STATISTICAL-ANALYSIS-RISK-ASSESSMENT-BA/](http://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-ba/mathematics-mathematics-statistical-analysis-risk-assessment-ba/))
- MATHEMATICS: MATHEMATICS FOR THE PHYSICAL AND BIOLOGICAL SCIENCES ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-PHYSICAL-BIOLOGICAL-SCIENCES-BA/](http://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-ba/mathematics-mathematics-physical-biological-sciences-ba/))

## HONORS IN THE MAJOR

Students may declare Honors in the Major in consultation with the Mathematics Honors advisor (<https://www.math.wisc.edu/undergraduate/advising/>); this should be done by the start of the junior year. Honors in the major is not available in any Named Option program.

## HONORS IN THE MATHEMATICS MAJOR REQUIREMENTS

To earn Honors in the Major, students must satisfy both the requirements for the mathematics major (above) and the following additional requirements:

- Earn a 3.300 University GPA
- Earn a 3.300 GPA for all MATH courses, and all courses accepted in the major
- Complete the following courses, with individual grades of B or better:

| Code                | Title   | Credits |
|---------------------|---|---------|
| MATH 521 & MATH 522 | Analysis I and Analysis II (Taken for Honors) <sup>6</sup>        |         |
| MATH 541 & MATH 542 | Modern Algebra and Modern Algebra (Taken for Honors) <sup>6</sup> |         |

Select at least two more courses from MATH 500 through MATH/E C E 641. These course must be taken for honors. The following will usually be one of the courses:<sup>7</sup>

|          |                     |
|----------|---------------------|
| MATH 551 | Elementary Topology |
|----------|---------------------|

Select one of these Capstone projects:

|                     |  |
|---------------------|--|
| MATH 681 & MATH 682 | Senior Honors Thesis and Senior Honors Thesis (For a total of 6 credits) |
|---------------------|--|

or

A sequence of two upper-level mathematics courses deemed acceptable by the Mathematics Honors advisor<sup>7</sup>

## FOOTNOTES

1

A course may only apply once toward the courses/credits required for the major. Thus, a course used to meet the Analysis, Topology and Algebra requirement may *not* also be used to meet the requirement for MATH 500-699 requirement and a course used to meet the MATH 500-699 requirement may *not* also be used in the Additional Math requirement.

2

Only one of these courses will be used to fulfill minimum course/credit requirements for the major: MATH 320, MATH 340, MATH 341, MATH 375

3

At most one course in Introductory Probability may be used to fulfill the course/credit requirements for the major: MATH/STAT 309 and MATH/STAT 431.

4

At most one course in Elementary Differential Equations may be used to fulfill the course/credit requirements for the major: MATH 319, MATH 320, MATH 376.

5

MATH courses numbered 307–699 are considered upper level in the major.

6

At least one of the two sequences (MATH 521–MATH 522 or MATH 541–MATH 542) must be completed prior to enrolling in the Capstone project.

7

Chosen in consultation with the Mathematics Honors advisor.

## UNIVERSITY DEGREE REQUIREMENTS

**Total Degree** To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

**Residency** Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

**Quality of Work** Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

### LEARNING OUTCOMES

1. State, explain, and apply the principal results, definitions, and theorems of a wide collection of mathematical areas including at least one area of advanced undergraduate mathematics.
2. Construct and evaluate mathematical proofs and arguments.
3. Acquire a diverse set of skills and strategies in mathematical reasoning/problem solving.
4. Use mathematics to model and analyze phenomena in other disciplines.
5. Write, explain, and present mathematics to both experts and non-experts.

### FOUR-YEAR PLAN

#### SAMPLE FOUR-YEAR PLAN

This Sample Four-Year Plan is a tool to assist students and their advisor(s). Students should use it—along with their DARS report, the Degree Planner, and Course Search & Enroll tools—to make their own four-year plan based on their placement scores, credit for transferred courses and approved examinations, and individual interests. As students become involved in athletics, honors, research, student organizations, study abroad, volunteer experiences, and/or work, they might adjust the order of their courses to accommodate these experiences. Students will likely revise their own four-year plan several times during college.

##### Mathematics Major - Bachelor of Arts/Science Degree

###### Freshman

| Fall                    | Credits | Spring                  | Credits |
|-------------------------|---------|-------------------------|---------|
| MATH 221 <sup>1,2</sup> |         | 5 MATH 222 <sup>2</sup> | 4       |
| Communication A         |         | 3 Ethnic Studies        | 3       |

|                              |                                |           |
|------------------------------|--------------------------------|-----------|
| Foreign Language (if needed) | 4 Foreign Language (if needed) | 4         |
| Literature Breadth           | 3 Literature Breadth           | 3         |
|                              |                                | <b>15</b> |

###### Sophomore

| Fall                     | Credits | Spring                           | Credits   |
|--------------------------|---------|----------------------------------|-----------|
| MATH 234                 |         | 4 MATH 341                       | 3         |
| Communication B          |         | 3 Intermediate MATH <sup>3</sup> | 3         |
| Humanities Breadth       |         | 3 Humanities Breadth             | 3         |
| Physical Science Breadth |         | 3 Physical Sciences Breadth      | 3         |
| Elective                 |         | 3 Elective                       | 3         |
|                          |         | <b>16</b>                        | <b>15</b> |

###### Junior

| Fall                           | Credits | Spring                           | Credits   |
|--------------------------------|---------|----------------------------------|-----------|
| Intermediate MATH <sup>3</sup> |         | 3 Intermediate MATH <sup>3</sup> | 3         |
| Advanced MATH <sup>4</sup>     |         | 3 Advanced MATH <sup>4</sup>     | 3         |
| Social Sciences Breadth        |         | 3 Social Sciences Breadth        | 3         |
| Biological Sciences Breadth    |         | 3 Biological Sciences Breadth    | 3         |
| Elective                       |         | 3 Elective                       | 3         |
|                                |         | <b>15</b>                        | <b>15</b> |

###### Senior

| Fall                       | Credits | Spring                    | Credits   |
|----------------------------|---------|---------------------------|-----------|
| Advanced MATH <sup>4</sup> |         | 3 Social Sciences Breadth | 3         |
| Social Science Breadth     |         | 3 Elective                | 3         |
| Elective                   |         | 3 Elective                | 3         |
| Elective                   |         | 3 Elective                | 3         |
| Elective                   |         | 3 Elective                | 3         |
|                            |         | <b>15</b>                 | <b>15</b> |

##### Total Credits 120

1

Math majors will naturally complete Quantitative Reasoning requirements with the introductory calculus courses required to declare the major.

2

Declaration of the Mathematics major requires a 2.500 cumulative GPA across the introductory calculus sequence. Students that are unable to establish a GPA for any courses in the introductory calculus sequence are encouraged to speak with a math major advisor as soon as possible.

3

An intermediate level math course is any numbered above 306 excluding MATH 320, MATH 340, or MATH 341, or MATH/CURRIC 471.

4

An advanced level MATH course is any numbered above 500.

### THREE-YEAR PLAN

#### SAMPLE THREE-YEAR PLAN

This Sample Three-Year Plan is a tool to assist students and their advisor(s). Students should use it—along with their DARS report, the Degree Planner, and Course Search & Enroll tools—to make their own

three-year plan based on their placement scores, credit for transferred courses and approved examinations, and individual interests.

Three-year plans may vary considerably from student to student, depending on their individual preparation and circumstances. Students interested in graduating in three years should meet with an advisor as early as possible to discuss feasibility, appropriate course sequencing, post-graduation plans (careers, graduate school, etc.), and opportunities they might forgo in pursuit of a three-year graduation plan.

## DEPARTMENTAL EXPECTATIONS

Historically, students who have successfully complete a three year undergraduate degree with a major in Mathematics have the following qualifications: a minimum of 29 advanced standing credits, which include completion of the following with either course credit or via placement examination:

- MATH 221 and MATH 222
- Communication Part A
- 3-4 units of foreign language

Therefore the plan below assumes these requirements, but none other. When considering the plan below, students should note the following:

- Advanced standing credits may satisfy Ethnic Studies, Communication Part B, and/or Letters & Science Breadth degree requirements which are listed in the plan. In this case, students should adjust their plan by reorganizing the remaining degree requirements using the following priorities: 1) Ethnic Studies and Communication Part B (obligatory in the first year); 2) Physical, Biological, and Social Science Breadth (which may be prerequisites for more advanced electives); 3) Humanities and Literature. Remaining schedule space should be considered electives.
- At least 26 of the non-MATH credits must be at the Intermediate or Advanced level.
- Consider using the elective space in the plan as follows: additional major or certificate, career readiness, graduate school preparation, and other personal interests.

### First Year

| Fall                       | Credits | Spring  | Credits   |
|----------------------------|---------|---|-----------|
| MATH 234                   |         | 4 MATH Linear Algebra                                   | 3         |
| Ethnic Studies             |         | 3 Intermediate MATH                                     | 3         |
| Communication B            |         | 3 Physical Science Breadth                              | 3         |
| Biological Science Breadth |         | 3 Biological Science Breadth                            | 3         |
| Physical Science Breadth   |         | 3 Foreign Language (if needed for the B.A.) or Elective | 3         |
|                            |         | <b>16</b>   | <b>15</b> |

### Second Year

| Fall                                      | Credits | Spring                                      | Credits   |
|---|---------|---|-----------|
| Intermediate MATH                         |         | 3 Advanced MATH                             | 3         |
| Advanced MATH                             |         | 3 Intermediate MATH                         | 3         |
| Literature Breadth                        |         | 3 Literature Breadth                        | 3         |
| Social Science Breadth                    |         | 3 Social Science Breadth                    | 3         |
| Elective (Intermediate or Advanced level) |         | 3 Elective (Intermediate or Advanced level) | 3         |
|   |         | <b>15</b>                                   | <b>15</b> |

### Third Year

| Fall                                      | Credits | Spring  | Credits   |
|---|---------|---|-----------|
| Advanced MATH                             |         | 3 Humanities Breadth (Intermediate or Advanced level)     | 3         |
| Social Science Breadth                    |         | 3 Social Science Breadth (Intermediate or Advanced level) | 3         |
| Humanities Breadth                        |         | 3 Elective (Intermediate or Advanced level)               | 9         |
| Elective (Intermediate or Advanced level) |         | 6   |           |
|   |         | <b>15</b>   | <b>15</b> |

**Total Credits 91**

## ADVISING AND CAREERS

### ADVISING

Students who are interested in the math major should visit a faculty advisor. Information about current advisor availability is on the Math advising page (<https://www.math.wisc.edu/undergraduate/advising/>).

For advice on college algebra, pre-calculus, and calculus, see the placement advising pages (<https://www.math.wisc.edu/undergraduate/placement/>) of the department.

### TRANSITION COURSES

All majors are required to complete at least one of the following. It is suggested that majors (and those interested in the major) complete such a course as soon in their academic career as possible.

| Code                | Title   | Credits |
|---------------------|---|---------|
| MATH 341            | Linear Algebra  |         |
| MATH 321 & MATH 322 | Applied Mathematical Analysis and Applied Mathematical Analysis |         |
| MATH 375            | Topics in Multi-Variable Calculus and Linear Algebra            |         |
| MATH 421            | The Theory of Single Variable Calculus                          |         |
| MATH 467            | Introduction to Number Theory                                   |         |

### GRADUATE STUDY

Students preparing for graduate work in mathematics should take the following courses:

| Code                    | Title  | Credits |
|-------------------------|--|---------|
| MATH 341<br>or MATH 375 | Linear Algebra<br>Topics in Multi-Variable Calculus and Linear Algebra | 3       |
| MATH 521                | Analysis I   | 3       |
| MATH 522                | Analysis II  | 3       |
| MATH 541                | Modern Algebra   | 3       |
| MATH 542                | Modern Algebra   | 3       |
| MATH 551                | Elementary Topology  | 3       |

or MATH 561 Differential Geometry

Select at least two other courses at the 500 level or higher

Students who plan to enter a mathematics Ph.D. program should acquire a reading knowledge of at least one foreign language as early as possible. For mathematics study, the most useful languages are French, German, and Russian.

## CAREERS

In recent years graduating math majors have obtained employment in a variety of jobs in business, industry, and governmental agencies and also have obtained teaching positions at the secondary school level (such teaching positions normally require teaching certification). Others have continued their education at the graduate level in mathematics and other fields. Departments in a variety of fields which use mathematics, including the social and biological sciences as well as in engineering and the physical sciences, are interested in attracting math majors into their graduate programs. Math Ph.D.'s obtain academic positions at the college and university level and nonacademic positions entailing consulting and research. The math major requirements are flexible enough to allow preparation for various goals.

## L&S CAREER RESOURCES

Every L&S major opens a world of possibilities. SuccessWorks (<https://successworks.wisc.edu/>) at the College of Letters & Science helps students turn the academic skills learned in their major, certificates, and other coursework into fulfilling lives after graduation, whether that means jobs, public service, graduate school or other career pursuits.

In addition to providing basic support like resume reviews and interview practice, SuccessWorks offers ways to explore interests and build career skills from their very first semester/term at UW all the way through graduation and beyond.

Students can explore careers in one-on-one advising, try out different career paths, complete internships, prepare for the job search and/or graduate school applications, and connect with supportive alumni and even employers in the fields that inspire them.

- SuccessWorks (<https://careers.ls.wisc.edu/>)
- Set up a career advising appointment (<https://successworks.wisc.edu/make-an-appointment/>)
- Enroll in a Career Course (<https://successworks.wisc.edu/career-courses/>) - a great idea for first- and second-year students:
  - INTER-LS 210 L&S Career Development: Taking Initiative (1 credit)
  - INTER-LS 215 Communicating About Careers (3 credits, fulfills Comm B General Education Requirement)
- Learn about internships and internship funding (<https://successworks.wisc.edu/finding-a-job-or-internship/>)
  - INTER-LS 260 Internship in the Liberal Arts and Sciences
- Activate your Handshake account (<https://successworks.wisc.edu/handshake/>) to apply for jobs and internships from 200,000+ employers recruiting UW-Madison students
- Learn about the impact SuccessWorks has on students' lives (<https://successworks.wisc.edu/about/mission/>)

## PEOPLE

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 Rycroft, Christopher  
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## ACADEMIC STAFF

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Keller, Mitch (Associate Director of Undergraduate Programs)  
Kwon, Oh Hoon (Associate Director of the Precalculus Program)  
Lindsey, Melissa (Director of Instructional Support)  
Phillipson, Kaitlyn (Undergraduate Course Coordinator)  
Williams, Cassie (Associate Director of Instructional and Professional Development)  
Work, Grace (Associate Director of Undergraduate Research)

## ENROLLMENT COORDINATOR

Kyle Martinez

## RESOURCES AND SCHOLARSHIPS

The Department of Mathematics offers scholarships, awards, and prizes (<https://math.wisc.edu/undergraduate/awards/>) to declared math majors. The majority of award opportunities are available in the fall semester with applications typically open midway through the semester. Spring awards are smaller in number and also open midway through the semester.

Awards vary in scope and criteria. Some awards are open to students who exhibit financial need, while others are granted to students based on academic merit. Other awards are related to undergraduate research. Awards may be open to specific student populations, such as:

- Underrepresented students of color
- Self-identified women
- Graduating majors
- Early-career majors

Declared math majors are encouraged to apply for any awards in which they meet the qualifications.