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

• Breadth—Humanities/Literature/Arts: 6 credits
• 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
• Breadth—Social Studies: 3 credits
• Communication Part A & Part B *
• Ethnic Studies *
• Quantitative Reasoning Part A & Part B *

* 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.

**REQUIREMENTS FOR THE MAJOR**

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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 341</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 320</td>
<td>Linear Algebra and Differential Equations</td>
<td></td>
</tr>
<tr>
<td>or MATH 340</td>
<td>Elementary Matrix and Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>or MATH 375</td>
<td>Topics in Multi-Variable Calculus and Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 521</td>
<td>Analysis I</td>
<td></td>
</tr>
<tr>
<td>MATH 541</td>
<td>Modern Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 551</td>
<td>Elementary Topology</td>
<td></td>
</tr>
<tr>
<td>MATH/ COMP SCI 513</td>
<td>Numerical Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH/ COMP SCI 514</td>
<td>Numerical Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 519</td>
<td>Ordinary Differential Equations</td>
<td></td>
</tr>
<tr>
<td>MATH 521</td>
<td>Analysis I</td>
<td></td>
</tr>
<tr>
<td>MATH 522</td>
<td>Analysis II</td>
<td></td>
</tr>
<tr>
<td>MATH/COMP SCI/ I SY E/STAT 525</td>
<td>Linear Optimization</td>
<td></td>
</tr>
<tr>
<td>MATH 531</td>
<td>Probability Theory</td>
<td></td>
</tr>
<tr>
<td>MATH 535</td>
<td>Mathematical Methods in Data Science</td>
<td></td>
</tr>
<tr>
<td>MATH 540</td>
<td>Linear Algebra II</td>
<td></td>
</tr>
<tr>
<td>MATH 541</td>
<td>Modern Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 542</td>
<td>Modern Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 551</td>
<td>Elementary Topology</td>
<td></td>
</tr>
<tr>
<td>MATH 552</td>
<td>Elementary Geometric and Algebraic Topology</td>
<td></td>
</tr>
<tr>
<td>MATH 561</td>
<td>Differential Geometry</td>
<td></td>
</tr>
<tr>
<td>MATH 567</td>
<td>Modern Number Theory</td>
<td></td>
</tr>
<tr>
<td>MATH 570</td>
<td>Fundamentals of Set Theory</td>
<td></td>
</tr>
<tr>
<td>MATH/ PHILOS 571</td>
<td>Mathematical Logic</td>
<td></td>
</tr>
<tr>
<td>MATH 605</td>
<td>Stochastic Methods for Biology</td>
<td></td>
</tr>
<tr>
<td>MATH 607</td>
<td>Topics in Mathematics Study Abroad</td>
<td></td>
</tr>
<tr>
<td>MATH 608</td>
<td>Mathematical Methods for Systems Biology</td>
<td></td>
</tr>
<tr>
<td>MATH/B M I/ BIOCHEM/ BMOLCHEM 609</td>
<td>Analysis of Partial Differential Equations</td>
<td></td>
</tr>
<tr>
<td>MATH 619</td>
<td>Introduction to Manifolds</td>
<td></td>
</tr>
<tr>
<td>MATH 621</td>
<td>Complex Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 627</td>
<td>Introduction to Fourier Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 629</td>
<td>Introduction to Measure and Integration</td>
<td></td>
</tr>
<tr>
<td>MATH/I SY E/ OTM/STAT 632</td>
<td>Introduction to Stochastic Processes</td>
<td></td>
</tr>
<tr>
<td>MATH 635</td>
<td>An Introduction to Brownian Motion and Stochastic Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH/E C E 641</td>
<td>Introduction to Error-Correcting Codes</td>
<td></td>
</tr>
<tr>
<td>MATH 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>MATH 682</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>MATH 691</td>
<td>Undergraduate Thesis</td>
<td></td>
</tr>
<tr>
<td>MATH 692</td>
<td>Undergraduate Thesis</td>
<td></td>
</tr>
<tr>
<td>MATH 698</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>MATH 699</td>
<td>Directed Study</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH/STAT 309</td>
<td>Introduction to Probability and Mathematical Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 331</td>
<td>An Introduction to Probability and Markov Chain Models</td>
<td></td>
</tr>
<tr>
<td>or MATH/ STAT 431</td>
<td>Introduction to the Theory of Probability</td>
<td></td>
</tr>
<tr>
<td>MATH/STAT 310</td>
<td>Introduction to Probability and Mathematical Statistics II</td>
<td></td>
</tr>
<tr>
<td>MATH 319</td>
<td>Techniques in Ordinary Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 376</td>
<td>Topics in Multi-Variable Calculus and Differential Equations</td>
<td></td>
</tr>
<tr>
<td>MATH 321</td>
<td>Applied Mathematical Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 322</td>
<td>Applied Mathematical Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 407</td>
<td>Topics in Mathematics Study Abroad</td>
<td></td>
</tr>
<tr>
<td>MATH 415</td>
<td>Applied Dynamical Systems, Chaos and Modeling</td>
<td></td>
</tr>
<tr>
<td>MATH 421</td>
<td>The Theory of Single Variable Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH/COMP SCI/ I SY E 425</td>
<td>Introduction to Combinatorial Optimization</td>
<td></td>
</tr>
<tr>
<td>MATH/COMP SCI/ E C E 435</td>
<td>Introduction to Cryptography</td>
<td></td>
</tr>
<tr>
<td>MATH 441</td>
<td>Introduction to Modern Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 443</td>
<td>Applied Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 461</td>
<td>College Geometry I</td>
<td></td>
</tr>
<tr>
<td>MATH 467</td>
<td>Introduction to Number Theory</td>
<td></td>
</tr>
</tbody>
</table>
MATH/ HIST SCI 473  History of Mathematics
MATH/COMP SCI/ Introduction to Combinatorics
STAT 475
MATH 490  Undergraduate Seminar
MATH 491  Topics in Undergraduate Mathematics
MATH/ COMP SCI 513  Numerical Linear Algebra
MATH/ COMP SCI 514  Numerical Analysis
MATH 519  Ordinary Differential Equations
MATH 521  Analysis I
MATH 522  Analysis II
MATH/COMP SCI/ Linear Optimization
ISYE/STAT 525
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/ PHILOS 571  Mathematical Logic
MATH 605  Stochastic Methods for Biology
MATH 607  Topics in Mathematics Study Abroad
MATH 608  Mathematical Methods for Systems Biology
MATH/BM/BIOCHEM/ BMOLCHEM 609
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/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

Total Credits 21

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.
• 15 credits in MATH, taken on the UW–Madison campus.

NAMED OPTIONS
View as list View as grid
• MATHEMATICS: MATHEMATICS FOR DATA AND RISK ANALYSIS (HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-DATA-RISK-ANALYSIS-BA/)
• MATHEMATICS: MATHEMATICS FOR ECONOMICS AND FINANCE (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/)
• MATHEMATICS: MATHEMATICS FOR SECONDARY EDUCATION (HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-SECONDARY-EDUCATION-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/)

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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 521 &amp; MATH 522</td>
<td>Analysis I and Analysis II (Taken for Honors)</td>
<td>6</td>
</tr>
<tr>
<td>MATH 541 &amp; MATH 542</td>
<td>Modern Algebra and Modern Algebra (Taken for Honors)</td>
<td>6</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 551</td>
<td>Elementary Topology</td>
<td></td>
</tr>
</tbody>
</table>

Select one of these Capstone projects:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 681 &amp; MATH 682</td>
<td>Senior Honors Thesis and Senior Honors Thesis (For a total of 6 credits)</td>
<td>6</td>
</tr>
</tbody>
</table>

or

A sequence of two upper-level mathematics courses deemed acceptable by the Mathematics Honors advisor

**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

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>1,2</td>
<td>5</td>
<td>MATH 222</td>
<td>2</td>
</tr>
<tr>
<td>Communication A</td>
<td>3 Ethnic Studies</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Language (if needed)</td>
<td>4 Foreign Language (if needed)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Chosen in consultation with the Mathematics Honors advisor.
Math majors will naturally complete Quantitative Reasoning requirements with the introductory calculus courses required to declare the major.

Delegation 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.

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

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.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 234</td>
<td>4 MATH 341</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic Studies</td>
<td>3 Intermediate MATH</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication B</td>
<td>3 Physical Science Breadth</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Science Breadth</td>
<td>3 Biological Science Breadth</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Science Breadth</td>
<td>3 Foreign Language (if needed for the B.A.) or Elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate MATH</td>
<td>3 Advanced MATH</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced MATH</td>
<td>3 Intermediate MATH</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature Breadth</td>
<td>3 Literature Breadth</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Breadth</td>
<td>3 Social Science Breadth</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective (Intermediate or Advanced level)</td>
<td>3 Elective (Intermediate or Advanced level)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Students preparing for graduate work in mathematics should take the following courses:

**GRADUATE STUDY**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 341</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 375</td>
<td>Topics in Multi-Variable Calculus and Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 521</td>
<td>Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 522</td>
<td>Analysis II</td>
<td>3</td>
</tr>
</tbody>
</table>

**TOTAL CREDITS 91**

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/)
- 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/)

**ADVISOR RESOURCES**

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 as in their academic career as possible.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 341</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 321</td>
<td>Applied Mathematical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>&amp; MATH 322</td>
<td>and Applied Mathematical Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 375</td>
<td>Topics in Multi-Variable Calculus and Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 421</td>
<td>The Theory of Single Variable Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH 467</td>
<td>Introduction to Number Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

**ADVISING AND CAREERS**

Students who are interested in the math major should visit a faculty advisor. During the fall and spring semesters faculty advisors have regular office hours. Students are encouraged to make appointments, but drop in advising is also welcome. During the winter break and the summer semester there are no fixed advising hours. Students should contact one of the advisors directly to set up an appointment. The current list of advisors, their schedule of office hours, and available appointments can be found at 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.
### PEOPLE

#### PROFESSORS:

- Anderson, David F
- Andrews, Uri
- Angenent, Sigurd B.
- Arinkin, Dima
- Calderaru, Andrei
- Craciun, Gheorghe
- Denisov, Sergey
- Ellenberg, Jordan
- Erman, Daniel M
- Feldman, Mikhail
- Gong, Xianghong
- Gurevich, Shangar
- Kent, Autumn Exum (Graduate Director)
- Lempp, Steffen
- Mari-Beffa, Gloria
- Maxim, Laurentiu
- Miller, Joseph S
- Paul, Sean T
- Poltoratski, Alexei
- Roch, Sebastien
- Rycroft, Christopher
- Seeger, Andreas
- Seppalainen, Timo (Chair)
- Smith, Leslie M.
- Soskova, Mariya
- Spagnolie, Saverio
- Stechmann, Sam
- Stovall, Betsy
- Street, Brian Thomas (Associate Chair)
- Terwilliger, Paul M.
- Thiffeault, Jean-Luc
- Valko, Benedek (Undergraduate Director)
- Waleffe, Fabian
- Yang, Tonghai

#### ASSOCIATE PROFESSORS:

- Dymarz, Tullia Maria
- Guo, Shaoming
- Ifrim, Mihaela
- Kim, Chanwoo
- Li, Qin
- Marshall, Simon Lindsay
- Tran, Hung Vinh
- Wang, Botong

#### ASSISTANT PROFESSORS:

- Apisa, Paul
- Chen, Nan
- Cochran, Amy
- Fabien, Maurice
- Kemeny, Michael L J
- Lawrence, Brian
- Loving, Marissa
- Lyu, Hanbaek
- Rodriguez, Jose Israel
- Shankar, Ananth
- Shcherbyna, Tetyana
- Shen, Hao
- Uyanik, Caglar
- Waldron, Alex
- Wu, Chenxi
- Zepeda-Nunez, Leonardo
- Zimmer, Andrew

#### ACADEMIC STAFF:

- Benguria Andrews, Soledad (Calculus Coordinator)
- Grizzard, Robert (Associate Director for Instructional Programs)
- Ivanov, Mikhail (Math Learning Center Instructor)
- Jackson, Billy (Director of the Precalculus Program)
- Keller, Mitch (Associate Director of Undergraduate Programs)
- Kwon, Oh Hoon (Associate Director of the Precalculus Program)
- Lindsey, Melissa (Director of Instructional Support)
- Phillipson, Kaitlyn (Linear Algebra Coordinator)
- Rineck, Leah (Math Learning Center Director)
- Williams, Cassie (Associate Director of Instructional and Professional Development)
- Work, Grace (Associate Director of Undergraduate Research)

### ENROLLMENT COORDINATOR:

Kyle Martinez