MATHEMATICS, BS

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 (https://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 (BS)

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.
Language	Complete the third unit of a language other than English.
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 also offers six named options (p. 3) for students interested in pursuing an applied focus area outside of mathematics as part of their major.

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 or MATH/STAT 431).

At least seven MATH courses for at least 21 credits are required for the major as follows[1]:

Code	Title	Credits
Linear Algebra (complete one) [2]		**3-5**
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
Analysis, Topology, Algebra (complete two)		**6**
MATH 521	Analysis I	
MATH 541	Modern Algebra	
MATH 551	Elementary Topology	

ADVANCED MATH ELECTIVE (COMPLETE ONE)

Code	Title	Credits
Complete at least one for three credits:		3
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/I SY E/ 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/ PHILOS 571	Mathematical Logic	
MATH 607	Topics in Mathematics Study Abroad	
MATH/B M I/ BIOCHEM/ BMOLCHEM 609	Mathematical Methods for Systems Biology	
MATH 616	Data-Driven Dynamical Systems, Stochastic Modeling and Prediction	
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/ OTM/STAT 632	Introduction to Stochastic Processes	
MATH 635	An Introduction to Brownian Motion and Stochastic Calculus	
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
Choose from the following:		9
MATH/STAT 431	Introduction to the Theory of Probability [3]	
or MATH/ STAT 309	Introduction to Probability and Mathematical Statistics I	
MATH/STAT 310	Introduction to Probability and Mathematical Statistics II	
MATH 319	Techniques in Ordinary Differential Equations [4]	
or MATH 376	Topics in Multi-Variable Calculus and Differential Equations	
MATH 321	Applied Mathematical Analysis 1: Vector and Complex Calculus	
MATH 322	Applied Mathematical Analysis 2: Partial Differential Equations	
MATH 390	Undergraduate Research with Madison Experimental Mathematics Lab [5]	
MATH 407	Topics in Mathematics Study Abroad	
MATH 415	Applied Dynamical Systems, Chaos and Modeling	
MATH 421	The Theory of Single Variable Calculus	
MATH/ COMP SCI/ I SY E 425	Introduction to Combinatorial Optimization	
MATH/ COMP SCI/ E C E 435	Introduction to Cryptography	
MATH 443	Applied Linear Algebra	
MATH 444	Graphs and Networks in Data Science	
MATH 461	College Geometry I	
MATH 467	Introduction to Number Theory	
MATH/ HIST SCI 473	History of Mathematics	
MATH/ COMP SCI/ STAT 475	Introduction to Combinatorics	
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/I SY E/ 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/ PHILOS 571	Mathematical Logic
MATH 607	Topics in Mathematics Study Abroad
MATH/B M I/ BIOCHEM/ BMOLCHEM 609	Mathematical Methods for Systems Biology
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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.[6]
- 15 credits in MATH, taken on the UW–Madison campus.

NAMED OPTIONS

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- **MATHEMATICS: MATHEMATICS FOR DATA SCIENCE (HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-DATA-SCIENCE-BA/)**
- **MATHEMATICS: MATHEMATICS FOR ECONOMICS AND FINANCE (HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-ECONOMICS-FINANCE-BA/)**
- **MATHEMATICS: MATHEMATICS FOR PROGRAMMING AND COMPUTING (HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-PROGRAMMING-COMPUTING-BA/)**
- **MATHEMATICS: MATHEMATICS FOR SECONDARY EDUCATION (HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-SECONDARY-EDUCATION-BA/)**
- **MATHEMATICS: MATHEMATICS FOR STATISTICAL ANALYSIS AND RISK ASSESSMENT (HTTPS://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/MATHEMATICS/MATHEMATICS-BA/MATHEMATICS-MATHEMATICS-STATISTICAL-ANALYSIS-RISK-ASSESSMENT-BA/)**
- **MATHEMATICS: MATHEMATICS FOR THE PHYSICAL AND BIOLOGICAL SCIENCES (HTTPS://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) [7]	
MATH 541 & MATH 542	Modern Algebra and Modern Algebra (Taken for Honors) [7]	
Select at least two more courses from MATH 500 through MATH 641. These course must be taken for honors. The following will usually be one of the courses: [8]		
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 [8]		

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 390 will only count once toward the major requirements
6. MATH courses numbered 307–699 are considered upper level in the major.
7. 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.
8. 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.