

Mathematics BS, Data Science Emphasis

General Education Requirements

All department majors must satisfy the university and appropriate school or college general education requirements (<http://bulletin.umsl.edu/generaleducationrequirements/>). All mathematics courses may be used to meet the university's general education breadth of study requirement in natural sciences and mathematics.

Satisfactory/Unsatisfactory Restrictions

All department majors may not take mathematical sciences or related area courses on a satisfactory/unsatisfactory basis. Students considering graduate study should consult with their advisers about taking work on a satisfactory/unsatisfactory basis.

Degree Requirements

All courses of the department presented to meet the degree requirements must be completed with a grade of C- or better. At least four courses numbered 3000 or above must be taken in residence. Students must have a 2.0 grade point average in the mathematical sciences courses completed.

Students enrolling in introductory mathematics courses should check the prerequisites to determine if a satisfactory score on the Mathematics Placement Test is necessary. Placement into introductory courses assumes a mastery of two years of high school algebra.

A minimum grade of C- is required to meet the prerequisite requirement for any course except with permission of the department.

Note: Courses that are prerequisites for higher-level courses may not be taken for credit or quality points if the higher-level course has been satisfactorily completed.

Many students are qualified, as a result of having studied calculus in high school, to begin their major with MATH 1900, Analytic Geometry and Calculus II, or MATH 2000, Analytic Geometry and Calculus III. These students are urged to consult with the department before planning their programs. Credit for MATH 1800, Analytic Geometry and Calculus I, will be granted to those students who complete MATH 1900 with a grade of C- or better.

Declaring the Mathematics Major

Students seeking to major in mathematics are first designated as "pre-mathematics majors" until they have completed both MATH 1900 and MATH 2000 or equivalent courses. Upon successful completion of these two courses with grades of C or better, students will be allowed to declare mathematics as their major. Each of these courses must be completed successfully within two attempts.

Degree Requirements in Mathematics

All mathematics majors in all undergraduate programs must complete the mathematics core requirements.

Core Requirements

- The following courses are required:

CMP SCI 1250	Introduction to Computing	3
MATH 1320	Introduction to Probability and Statistics	3
MATH 1800	Analytic Geometry and Calculus I	5
MATH 1900	Analytic Geometry and Calculus II	5
MATH 2000	Analytic Geometry and Calculus III	5
MATH 2020	Introduction to Differential Equations	3
MATH 2450	Elementary Linear Algebra	3
MATH 3250	Foundations of Mathematics	3
or CMP SCI 3130	Design and Analysis of Algorithms	
MATH 4100	Real Analysis I	3
Total Hours		33

- The related area requirements as described below must be satisfied. Students seeking a double degree, either within this department or with another department, do not have to fulfill the related area requirements.

In addition to the core requirements, the B.S. in Mathematics degree requires:

- Completing all of the following:

MATH 4160	Complex Analysis I	3
MATH 4400	Introduction to Abstract Algebra I	3
MATH 4450	Linear Algebra	3
Total Hours		9

- Completing an additional three courses numbered above 4000 in mathematics, statistics or computer science, at least one of which must be in mathematics/statistics.

Emphasis Area Requirements

CMP SCI 2250	Programming and Data Structures	3
MATH 1320	Introduction to Probability and Statistics	3
MATH 1800	Analytic Geometry and Calculus I	5
MATH 1900	Analytic Geometry and Calculus II	5
MATH 2000	Analytic Geometry and Calculus III	5
MATH 2020	Introduction to Differential Equations	3
MATH 2450	Elementary Linear Algebra	3
MATH 3250	Foundations of Mathematics	3
MATH 4100	Real Analysis I	3

Specialized Requirements

MATH 4005	Exploratory Data Analysis with R	3
MATH 4070	Introduction to Nonlinear Optimization	3
MATH 4200	Mathematical Statistics I	3
MATH 4210	Mathematical Statistics II	3
MATH 4250	Introduction to Statistical Methods in Learning and Modeling	3

Elective Requirements		12
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Choose two courses from the following list and two additional courses in mathematics, statistics or computer science numbered above 4000:

MATH 3320	Applied Statistics
MATH 4080	Introduction to Scientific Computation
MATH 4090	Introduction to High-dimensional Data Analysis
MATH 4220	Bayesian Statistical Methods
MATH 4225	Introduction to Statistical Computing
MATH 4260	Introduction to Stochastic Processes
MATH 4450	Linear Algebra

Total Hours 60

There are no related area requirements.

Computer Science majors who would like to pursue the B.S. in Mathematics (Emphasis in Data Science) are not required to take MATH 2020 and must:

- complete all courses in the core requirements, except for MATH 4100 and may substitute MATH 3000 for MATH 3250
- complete all courses in the specialized requirements and one from elective requirements.

B.S. Ed. in Secondary Education with Emphasis in Mathematics

The B.S. Ed. is a professional education degree designed for students who wish to pursue a teaching career in secondary schools. Much of the discipline-specific coursework parallels the B.A. or B.S. degree in the discipline; however, the Missouri Department of Elementary and Secondary Education (DESE) requires specific coursework for teacher certification. Therefore, students interested in the B.S. Ed. should contact the advising office (OASIS) 314-516-5937 in the College of Education for discipline-specific requirements. *Note: To obtain teaching certification, DESE requires a 3.0 GPA in the discipline and professional education coursework, as well as a 2.75 GPA overall.*

B.A. or B.S. in Mathematics with Master's Level Coursework for Secondary Teacher Certification

In addition to the B.S. Ed., students may opt to complete a B.A. or B.S. degree in their discipline as an undergraduate, followed by admission to the Graduate School for Master's level teaching certification. The College of Education has a one-year accelerated program for post-graduate certification called Teach in 12, or students can choose a traditional path to certification. Graduate coursework for certification can apply towards a Master's Degree in Secondary Education, with additional coursework. Students interested in Master's Level teacher certification should contact the advising office (OASIS) 314-516-5937 in the College of Education. *Note: To obtain teaching certification, DESE requires a 3.0 GPA in the discipline and professional education coursework, as well as a 2.75 GPA overall.*

Learning Outcomes

A successful undergraduate should, upon completion, be able to:

- Write clear, logically consistent proofs.
- Read, understand and assess the veracity of logical arguments or mathematical proofs.
- Reformulate problems or questions in relevant mathematical terms.
- Solve problems which involve analysis, algebra or linear algebra, elementary number theory.
- Interpret, formulate and solve problems and assess data related questions from an advanced probabilistic and statistical viewpoint.

Sample Four Year Plan

First Year			
Fall	Hours	Spring	Hours
INTDSC 1003 ¹		1 CMP SCI 1250	3
ENGL 1100		3 MATH 1900	5
MATH 1800		5 MATH 1320	3
CORE - U.S. History and Government		3 EXPLORE - Humanities and Fine Arts	3
CORE - Communication Proficiency		3 EXPLORE - Social Sciences	3
		15	17
Second Year			
Fall	Hours	Spring	Hours
CMP SCI 2250		3 MATH 2020	3
MATH 2000		5 MATH 3250	3
MATH 2450		3 EXPLORE - Humanities and Fine Arts	3
Cultural Diversity Requirement		3 EXPLORE - Social Sciences	3
		EXPLORE - Social Sciences	3
		14	15
Third Year			
Fall	Hours	Spring	Hours
MATH 4070		3 MATH 4005	3
MATH 4100		3 MATH 4200	3
MATH 3000+ level Course		3 MATH 4250	3
EXPLORE - Social Sciences		3 Elective or minor	6
ENGL 3100		3	
		15	15
Fourth Year			
Fall	Hours	Spring	Hours
MATH 3000+ level Course		3 MATH/CMP SCI elective	6
MATH 4210		3 Elective or minor	8
EXPLORE - Humanities and Fine Arts		3	
Elective or minor		6	
		15	14
Total Hours: 120			

¹ INTDSC 1003 is required only for first-time freshmen and transfer students with less than 24 college credits.

PLEASE NOTE: This plan is an example of what a four year plan could look like for a typical student. Placement exam scores in math as well as the completion of coursework may change the plan. It should not be used in the place of regular academic advising appointments. All students are encouraged to meet with their advisor each semester. All requirements are subject to change.