# Mathematics BS, Data Science Emphasis 

## General Education Requirements

All department majors must satisfy the university and appropriate school or college general education requirements. 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 Cor better.

## Declaring the Mathematics Major

Students seeking to major in mathematics are first designated as "premathematics 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 ${ }^{1}$ | 3 |
| :--- | :--- | :--- |
| MATH 1320 | Introduction to Probability and <br> MATH 1800 <br> MATH 1900 | 3 |
| MATics |  |  |
| MATH 2000 | Analytic Geometry and Calculus I | 5 |
| MATH 2020 | Analytic Geometry and Calculus II | 5 |
| MATH 2450 | Analytic Geometry and Calculus III | 5 |
| MATH 3250 | Introduction to Differential Equations | 3 |
| or CMP SCI 3130 | Elementary Linear Algebra | 3 |
| MATH 4100 | Foundations of Mathematics | 3 |

Total Hours 33

1
Students in the Fiscal Mathematics program will take MATH 4200 instead. 2

Students in the Fiscal Mathematics program will take MATH 4210 instead.
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.

## Emphasis Area Requirements

| CMP SCI 2250 | Programming and Data Structures | 3 |
| :--- | :--- | :--- |
| MATH 4005 | Exploratory Data Analysis with R | 3 |
| MATH 4070 | Introduction to Nonlinear | 3 |
| MATH 4200 | Optimization | 3 |
| MATH 4210 | Mathematical Statistics I | 3 |
| MATH 4250 | Mathematical Statistics II | 3 |
|  | Introduction to Statistical Methods in | 3 |

## Elective Requirements

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 |
| Mata Analysis |  |
| MATH 4220 | Bayesian Statistical Methods |
| MATH 4225 | Introduction to Statistical Computing |
| MATH 4260 | Introduction to Stochastic Processes |
| MATH 4450 | Linear Algebra |
| MATH 4750 | Introduction to Mathematics of |

## Total Hours

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:
a) complete all courses in the core requirements, except for MATH 4100 and may substitute MATH 3000 for MATH 3250
b) 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 |
| INTDSC $1003^{1}$ |  | Hours |
| ENGL 1100 | CMP SCI 1250 | 3 |
| MATH 1800 | 3 MATH 1900 | 5 |
| CORE - U.S. History and Government | 5 MATH 1320 | 3 |
| CORE - Communication Proficiency | 3 EXPLORE - Humanities and Fine Arts | 3 |
|  | 3 EXPLORE - Social Sciences | 3 |

Second Year

| Fall | Hours | Spring |
| :--- | ---: | ---: | Hours | CMP SCI 2250 | 3 MATH 2020 |
| :--- | :--- |
| MATH 2000 | 5 MATH 3250 |


| 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 4005 |  | 3 MATH 4100 | 3 |
| MATH 4070 |  | 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.

