Mathematics BS, Fiscal Mathematics 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.

Similarly, students who are ready to begin their computer science studies with CMP SCI 2250, Programming and Data Structures, will be granted credit for CMP SCI 1250, Introduction to Computing, once they complete CMP SCI 2250 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
1. 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

2. 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.

Related Area Requirements for majors in Mathematics
Candidates for the B.A. in Mathematics must satisfy the requirements in one of the groups below with a grade of C-or better. Candidates for the B.S.Ed. in Mathematics and B.S. in Mathematics must satisfy the requirements in two of the groups below with a grade of C-or better.

If candidates choose group 2, then they cannot apply either of the two courses listed in that group towards the additional 4000 level mathematics courses (beyond the core requirements) that must be completed for each of these degrees.

Students seeking a double degree, either within this department or with another department do not have to fulfill the related area requirements.

Related Area Courses
1) Computer Science
   Select two of the following: 6
   - CMP SCI 2250 Programming and Data Structures
   - CMP SCI 2700 Computer Organization and Architecture
   - CMP SCI 3130 Design and Analysis of Algorithms
   - CMP SCI 4140 Theory of Computation
   - CMP SCI 4410 Introduction to Computer Graphics
   - CMP SCI 4420 Introduction to Digital Image Processing

2) Statistics
   - MATH 4200 Mathematical Statistics I 3
   - MATH 4210 Mathematical Statistics II 3

3) Biology
   - BIOL 2102 General Ecology 3
BIOL 2103  General Ecology Laboratory  2

4) Biology
BIOL 2012  Genetics  3
BIOL 4182  Population Biology  3

5) Chemistry
CHEM 1111  Introductory Chemistry I (MOTR CHEM 150L)  5
CHEM 1121  Introductory Chemistry II  5

6) Chemistry
CHEM 3312  Physical Chemistry I  3
And another 3000-level, or above, chemistry course.  3

7) Economics
ECON 1001  Principles of Microeconomics (MOTR ECON 102)  3
ECON 1002  Principles of Macroeconomics (MOTR ECON 101)  3
ECON 4100  Introduction to Econometrics  4

8) Philosophy
PHIL 3360  Formal Logic  3
PHIL 3380  Philosophy of Science  3

9) Physics
PHYSICS 2111  Physics: Mechanics and Heat (MOTR PHYS 200L)  5
PHYSICS 2112  Physics: Electricity, Magnetism, and Optics  5

10) Physics
PHYSICS 3221  Mechanics  3
And another 3000 level, or above, physics course.  3

11) Business Administration
SCMA 3320  Advanced Supply Chain and Operations Management  3
SCMA 4350  Prescriptive Analytics and Optimization  3

12) Engineering
ENGR 2310  Statics  3
ENGR 2320  Dynamics  3

Emphasis Area Requirements
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 4200  Mathematical Statistics I  3
MATH 4210  Mathematical Statistics II  3

Specialized Requirements
MATH 4010  Financial Mathematics I  3
MATH 4020  Financial Mathematics II  3
FINANCE 3500  Financial Management  3
MATH 4005  Exploratory Data Analysis with R  3

In addition, two further courses in mathematics, statistics or computer science numbered above 4000.

Related Requirements
ECON 4100  Introduction to Econometrics  4
ECON 4110  Applied Econometrics  4
or ECON 4130  Business and Economic Forecasting  4
Complete two of the following courses:  6
FINANCE 3503  Computer Applications in Finance  3
FINANCE 3520  Investments  3
FINANCE 3521  Financial Engineering: Applying Derivatives  3
FINANCE 3523  Fixed Income Analysis  3
FINANCE 3540  Introduction to Financial Institutions and Financial Markets  3

Total Hours  65

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 applied problems in probability and statistics.
• Interpret, formulate and solve applied problems in mathematics relating to annuities, bonds and derivative investments.

### Sample Four Year Plan

#### First Year

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<th>Fall</th>
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#### Second Year

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#### Third Year

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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.