Mathematics BA

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 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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP SCI 1250</td>
<td>Introduction to Computing</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1320</td>
<td>Introduction to Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1800</td>
<td>Analytic Geometry and Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>MATH 1900</td>
<td>Analytic Geometry and Calculus II</td>
<td>5</td>
</tr>
<tr>
<td>MATH 2000</td>
<td>Analytic Geometry and Calculus III</td>
<td>5</td>
</tr>
<tr>
<td>MATH 2450</td>
<td>Elementary Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3250</td>
<td>Foundations of Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>or CMP SCI 3130</td>
<td>Design and Analysis of Algorithms</td>
<td></td>
</tr>
<tr>
<td>MATH 4100</td>
<td>Real Analysis I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>

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.

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP SCI 2250</td>
<td>Programming and Data Structures</td>
</tr>
<tr>
<td>CMP SCI 2700</td>
<td>Computer Organization and Architecture</td>
</tr>
<tr>
<td>CMP SCI 3130</td>
<td>Design and Analysis of Algorithms</td>
</tr>
<tr>
<td>CMP SCI 4410</td>
<td>Introduction to Computer Graphics</td>
</tr>
<tr>
<td>CMP SCI 4420</td>
<td>Introduction to Digital Image Processing and Computer Vision</td>
</tr>
</tbody>
</table>

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

3) Biology
BIOI 2102  Ecology  3
BIOI 2103  Ecology Laboratory  2

4) Biology
BIOI 2012  Genetics  3
BIOI 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: Thermodynamics and Kinetics  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  4
PHYSICS 2112  Physics: Electricity, Magnetism, and Optics  4

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

In addition to the core requirements and the College of Arts and Sciences’ foreign language requirement, three mathematics courses at the 4000 level or higher must be completed. Of these, one must be MATH 4400, Introduction to Abstract Algebra.

**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, elementary probability or statistics.
- Demonstrate basic proficiency in speaking, reading and writing in a language in addition to English.

**Sample Four Year Plan**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTDSC 1003</td>
<td>1 MATH 1320</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENGL 1100</td>
<td>3 MATH 1900</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>MATH 1800</td>
<td>5 CMP SCI 1250</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EXPLORE - Humanities &amp; Fine Arts</td>
<td>3 EXPLORE - Social Sciences</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EXPLORE - Social Sciences</td>
<td>3 CORE - US History and Government</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>15</strong></td>
<td><strong>17</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2000</td>
<td>5 MATH 2020</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 3250</td>
<td>3 MATH 2450</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EXPLORE - Humanities and Fine Arts</td>
<td>3 EXPLORE - Social Sciences</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Foreign Language 1001</td>
<td>5 Foreign Language 1002</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>16</strong></td>
<td><strong>14</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 3100</td>
<td>3 MATH 4100</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 4400</td>
<td>3 Cultural Diversity Requirement</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Foreign Language 2101</td>
<td>3 2000-level Related Area Requirement</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EXPLORE - Humanities and Fine Arts</td>
<td>3 Elective or minor</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CORE - Communication Proficiency</td>
<td>3 Elective or minor</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>15</strong></td>
<td><strong>15</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 4000+ level course</td>
<td>3 MATH 4000-level course</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2000-level Related Area Requirement</td>
<td>3 2000-level Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elective or minor</td>
<td>3 Elective or minor</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>2000-level Elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-level Elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>15</strong></td>
<td><strong>13</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 120
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.