MATHEMATICS (B.A.)

The courses offered by the Department of Mathematics serve several purposes; they supply the mathematical preparation necessary for students specializing in the physical, life or social sciences, in business administration, in engineering, and in education; they provide a route by which students may achieve a level of competence to do research in any of several special mathematical areas; they allow students to prepare themselves for work as mathematicians and statisticians in industry and government; and they give an opportunity to all inquisitive students to learn something about modern mathematical ideas.

Admission Requirements

Admission requirements for this program are satisfied by the general requirements for undergraduate admission (http://bulletins.wayne.edu/undergraduate/general-information/admission) to the University. Undergraduates declaring a mathematics major are strongly encouraged to meet with a departmental advisor before doing so. After a student’s acceptance as a major, a student should consult a Departmental advisor at least once a year to verify progress.

Candidates must complete 120 credits in course work including satisfaction of the University General Education Requirements (http://bulletins.wayne.edu/undergraduate/general-information/college-liberal-arts-sciences/bachelors-degree-requirements), as well as the departmental major requirements cited below. All course work must be completed in accordance with the regulations of the University (http://bulletins.wayne.edu/undergraduate/general-information/academic-regulations) and the College (http://bulletins.wayne.edu/undergraduate/college-liberal-arts-sciences/academic-regulations) governing undergraduate scholarship and degrees. The cumulative grade point average in mathematics (MAT) courses required for completion of a major option must be at least 2.0.

Major Requirements

In addition to the general bachelor’s degree requirements, the candidate must complete one of the following concentrations: A, B, C, D, or E, as described below.

Option A: Prospective Graduate Study

This option is recommended for students who plan to pursue graduate study in mathematics.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MAT 2010</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MAT 2020</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MAT 2030</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MAT 2150</td>
<td>Differential Equations and Matrix Algebra</td>
<td>4</td>
</tr>
<tr>
<td>or MAT 2350</td>
<td>Elementary Differential Equations</td>
<td></td>
</tr>
<tr>
<td>MAT 2250</td>
<td>Elementary Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MAT 5070</td>
<td>Elementary Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MAT 5420</td>
<td>Algebra I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; MAT 5993</td>
<td>and (WI) Writing Intensive Course in Mathematics</td>
<td></td>
</tr>
<tr>
<td>MAT 5430</td>
<td>Algebra II</td>
<td>3-4</td>
</tr>
<tr>
<td>or MAT 5610</td>
<td>Introduction to Analysis II</td>
<td></td>
</tr>
<tr>
<td>MAT 5600</td>
<td>Introduction to Analysis I</td>
<td>4</td>
</tr>
<tr>
<td>MAT 5700</td>
<td>Introduction to Probability Theory</td>
<td>4</td>
</tr>
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Select one of the following: 3-4

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<tr>
<td>MAT 5230</td>
<td>Complex Variables and Applications</td>
<td></td>
</tr>
<tr>
<td>MAT 5430</td>
<td>Algebra II</td>
<td></td>
</tr>
</tbody>
</table>

MAT 5520  Introduction to Topology  4
MAT 5530  Elementary Differential Geometry and its Applications  4
MAT 5610  Introduction to Analysis II  4
MAT 5800  Introduction to Mathematical Statistics  4
Select one course from one of the following groups: 1-4

Group A
Any Mathematics course numbered 5030 or above 1

Group B
Select one CSC of the following (depending on topic):
CSC 6500 Theory of Languages and Automata
CSC 6620 Matrix Computation I
CSC 6991 Topics in Computer Science (depending on the topic)

Total Credits 42-47

1 Excluding MAT 5120, MAT 5130, MAT 5180, MAT 5190,
MAT 5992, MAT 6130, MAT 6150, MAT 6170, MAT 6180, MAT 6200,
or MAT 6210. Only one (at most) of the courses may be selected
from MAT 5890 or MAT 5990. These electives are subject to advisor
approval on the Student’s Plan of Work.

Option B: General Mathematics

This option is for students interested in a broad range of topics.

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<td>MAT 5070</td>
<td>Elementary Analysis</td>
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<td>Algebra I</td>
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<td>&amp; MAT 5993</td>
<td>and (WI) Writing Intensive Course in Mathematics</td>
<td></td>
</tr>
<tr>
<td>MAT 5700</td>
<td>Introduction to Probability Theory</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following: 9-12

Three additional Mathematics courses numbered 5030 or above OR 1

Two such courses, plus one of the following: (depending on topic)
CSC 6500 Theory of Languages and Automata
CSC 6580 Design and Analysis of Algorithms
CSC 6620 Matrix Computation I
CSC 6991 Topics in Computer Science (depending on the topic)

Total Credits 40-43

1 Excluding MAT 5120, MAT 5130, MAT 5180, MAT 5190,
MAT 5992, MAT 6130, MAT 6150, MAT 6170, MAT 6180, MAT 6200,
or MAT 6210. Only one (at most) of the courses may be selected
from MAT 5890 or MAT 5990. These electives are subject to advisor
approval on the Student’s Plan of Work.

Option C: Secondary Teaching

This option is recommended for students in the Combined Curriculum for Secondary Teaching.

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<td>MAT 2030</td>
<td>Calculus III</td>
<td>4</td>
</tr>
</tbody>
</table>
MAT 2210/6150 Probability and Statistics 4
MAT 2250 Elementary Linear Algebra 3
MAT 2860/6130 Discrete Mathematics 3
MAT 5000 Fundamental Concepts of Mathematics and Proof Writing 3
MAT 5070 Elementary Analysis 4
MAT 6140 Geometry: An Axiomatic Approach 3
MAT/MAE 6200 Teaching Arithmetic, Algebra and Functions from an Advanced Perspective 3

Select one of the following options: 4
MAT 6170 Algebra: Ring Theory Through Exploration, Conjecture, and Proof (OR)
MAT 5420 Algebra I
& MAT 5993 and (WI) Writing Intensive Course in Mathematics

Select one of the following: 3-4
MAT 5400 Elementary Theory of Numbers
MAT 5520 Introduction to Topology
MAT 5600 Introduction to Analysis I
MAT 6180 Algebra: Group Theory Through Exploration, Conjecture, and Proof

Total Credits 42-43

**Option D: Computer Science**

Mathematics and computer science are so closely related that a great many students who major in mathematics pursue careers or graduate study in computer science. A mathematics degree, being more than just welcome in the field, is highly regarded. For students who would like to complete a double major in mathematics and computer science or a major in mathematics with a minor in computer science, the Department offers a specially designed program. Under this option, students can take certain courses that satisfy both mathematics and computer science requirements simultaneously. Specifically, MAT 5100 can be used as a computer science elective and one of CSC 5860, CSC 5870, CSC 6500, CSC 6620, or CSC 6991 (depending on the topic) can be used as a mathematics elective.

This option is available only to students who complete a second major or a minor in computer science. Students should consult the Computer Science Department for their major and minor requirements.

MAT 2010 Calculus I 4
MAT 2020 Calculus II 4
MAT 2030 Calculus III 4
MAT 2210/6150 Probability and Statistics 4
MAT 2250 Elementary Linear Algebra 3
MAT 2860/6130 Discrete Mathematics 3
MAT 5070 Elementary Analysis 4
MAT 5100 Numerical Methods I 3
MAT 5420 Algebra I
& MAT 5993 and (WI) Writing Intensive Course in Mathematics

Select one of the following: 9-12
Two additional Mathematics courses numbered above 5030 1
One such course from the above, plus one of the following (depending on topic):
CSC 5860 Introduction to Pattern Recognition and Document Analysis
CSC 5870 Computer Graphics I
CSC 6500 Theory of Languages and Automata

Total Credits 42-45

1 Excluding MAT 5120, MAT 5130, MAT 5180, MAT 5190, MAT 5992, MAT 6130, MAT 6150, MAT 6170, MAT 6180, MAT 6200, or MAT 6210. Only one (at most) of the courses may be selected from MAT 5890 or MAT 5990. These electives are subject to advisor approval on the Student’s Plan of Work.

**Option E: Actuarial Science**

Students embarking on a career as an actuary will be expected to pass certain exams administered by that profession. Option E provides the course work covered by the first few of these exams: Calculus, Linear Algebra, Probability and Statistics, Numerical Analysis, and Operations Research.

MAT 2010 Calculus I 4
MAT 2020 Calculus II 4
MAT 2030 Calculus III 4
MAT 2250 Elementary Linear Algebra 3
MAT 5070 Elementary Analysis 4
MAT 5100 Numerical Methods I 3
MAT 5420 Algebra I
& MAT 5993 and (WI) Writing Intensive Course in Mathematics
MAT 5700 Introduction to Probability Theory 4
MAT 5770 Mathematical Models in Operations Research 3
MAT 5800 Introduction to Mathematical Statistics 4

Select one of the following:
MAT 2150 Differential Equations and Matrix Algebra
MAT 2350 Elementary Differential Equations

One additional Mathematics course numbered above 5030 1

Total Credits 37

1 Excluding MAT 5120, MAT 5130, MAT 5180, MAT 5190, MAT 5992, MAT 6130, MAT 6150, MAT 6170, MAT 6180, MAT 6200, or MAT 6210. Only one (at most) of the courses may be selected from MAT 5890 or MAT 5990. These electives are subject to advisor approval on the Student’s Plan of Work.

**Combined Curriculum for Secondary Teaching (CCST)**

Under the Combined Curriculum, it is possible to earn a bachelor’s degree in mathematics concurrent with a secondary teaching certificate. Students in CCST may satisfy the mathematics part of their degree requirements by any of the degree options specified below, though Option C is specifically designed and recommended for future teachers. It is recommended but not required that CCST students who do not choose Option C take MAT 2860, MAT 5000, and MAT 6140.

**Emerging Scholars Program**

The Emerging Scholars Program is a special honors program at the levels of MAT 1800, MAT 2010, and MAT 2020, that features collaborative learning through a challenging problem-solving workshop attached to the regular class. Each ESP calculus course (MAT 2010 and MAT 2020) carries four honors credits, though MAT 1800 does not offer honors credits. The program seeks dedicated, hard-working students who want to excel in mathematics. Students who place into the level below
MAT 1800 are encouraged to enroll in MAT 1050 PREP as preparation for the Program. Contact the Department for further information.

‘AGRADE’ Program (Accelerated Graduate Enrollment)

The Department of Mathematics participates in the College ‘AGRADE’ (Accelerated Graduate Enrollment) Program, in which qualified students can earn a master’s degree and bachelor’s degree. For more details about the ‘AGRADE’ Program, contact one of the graduate mathematics advisors, or the Graduate Office of the College (313-577-2960).