Mathematics, BS

Requirements
The Bachelor of Science with a major in mathematics requires a minimum of 120 s.h., including at least 44-56 s.h. (13-14 courses) of work for the major. Total credit for the major depends on a student's choice of Program A, B, or C. Students must maintain a grade-point average of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core.

All students complete the post-calculus mathematics requirement, the upper-level mathematics requirement, and the requirements for Program A, B, or C.

For policies concerning transfer credit, correspondence credit, credit by examination, cumulative grade-point average, general rules relating to regression and duplication, and so forth, see For Undergraduate Students on the College of Liberal Arts and Sciences website.

For information about duplication, regression, and use of the second-grade-only option for mathematics courses, contact the Department of Mathematics or visit the Department of Mathematics website. The website also provides details about schedule planning and career options for mathematics students. For more information on admission, financial support, employment opportunities, the faculty, facilities, and other topics, visit the Department of Mathematics or the University of Iowa website.

The BS with a major in mathematics (Program A, B, or C) requires the following coursework.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Requirements (semester hours vary in Program A, B, or C selection)</td>
<td>44-56</td>
</tr>
</tbody>
</table>

Post-Calculus Mathematics Requirement
Students majoring in mathematics must earn at least 15 s.h. in post-calculus mathematics courses (prefix MATH) offered by the Department of Mathematics or cross-referenced with a mathematics course at the University of Iowa; students may not count transfer courses or credit by exam toward this requirement.

Post-calculus courses in the Department of Mathematics are numbered 2000 and above, excluding these:

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:3700</td>
<td>Introduction to Matrix Theory</td>
<td>3</td>
</tr>
<tr>
<td>MATH:3750</td>
<td>Classical Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH:3995</td>
<td>Topics in Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH:3996</td>
<td>Individual Study and Honors in Mathematics</td>
<td>arr.</td>
</tr>
<tr>
<td>MATH:3997</td>
<td>Readings in Mathematics</td>
<td>arr.</td>
</tr>
<tr>
<td>MATH:4010</td>
<td>Basic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH:4020</td>
<td>Basic Abstract Algebra</td>
<td>3</td>
</tr>
</tbody>
</table>

Upper-Level Mathematics Requirement
Mathematics majors must take at least two upper-level mathematics courses (three in Program A) for the BS degree. Upper-level mathematics courses include MATH:3900 Introduction to Mathematics Research and courses numbered 4000 or above, excluding these:

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:4010</td>
<td>Basic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH:4020</td>
<td>Basic Abstract Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH:4120</td>
<td>History of Mathematics</td>
<td>3</td>
</tr>
</tbody>
</table>

No courses from other departments can be counted as upper-level mathematics courses, unless they are cross-referenced with an upper-level mathematics course (prefix MATH).

Program A
Program A is primarily for students who plan to work in business or government or to pursue graduate study in mathematics.

Program A: Core Courses
Students must complete a two-semester sequence of MATH:1850 Calculus I and MATH:1860 Calculus II. Advanced placement credit, CLEP credit, and credit granted through the Mathematics Incentive Program are accepted for all or part of the calculus requirement.

Students complete the following core courses.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:1850</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1860</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH:2700</td>
<td>Introduction to Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH:2850</td>
<td>Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>MATH:3650</td>
<td>Introduction to Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH:3720</td>
<td>Introduction to Abstract Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH:3770</td>
<td>Fundamental Properties of Spaces and Functions</td>
<td>3</td>
</tr>
</tbody>
</table>

More advanced courses may be substituted for the core courses with Department of Mathematics approval.

Program A: Electives
Students complete six electives (18-24 s.h.), including at least four courses in the Department of Mathematics (prefix MATH). Of these four courses, at least three must be upper-level mathematics courses.

Mathematics
Students may choose from mathematics courses numbered MATH:2150 Foundations of Geometry, MATH:3800 Introduction to Numerical Methods, or courses above MATH:3800, excluding MATH:4010 Basic Analysis and MATH:4020 Basic Abstract Algebra.

Computer Science
Students may choose computer science courses numbered CS:1210 through CS:4740, excluding CS:3210 Programming Languages and Tools, CS:3910 Informatics Project, CS:3980
Mathematics Research

Department of Mathematics post-calculus courses (9–12 Students in Program B must take at least three additional
Program B: Electives
courses with Department of Mathematics approval. More advanced courses may be substituted for the core
core courses.

Among the courses listed above, only one of the following three courses can be counted toward the elective
requirement: STAT:2020, STAT:3100, or STAT:3120. None of these courses can be counted as credit earned toward
graduation if taken after STAT:4100 Mathematical Statistics I owing to regression policies.

Students may choose actuarial science courses numbered
ACTS:3080 Mathematics of Finance I and ACTS:4130 through
ACTS:4380.

Consult the Department of Mathematics website for a
complete list of electives in computer science, and statistics
and actuarial science.

Program B

Program B is intended for students seeking secondary school
teaching licensure. Students who wish to earn teaching
licensure in addition to earning a Bachelor of Science with
a major in mathematics also must complete the Teacher
Education Program (TEP); see “Teacher Licensure” below.

Program B: Core Courses

Students must complete a two-semester sequence of
MATH:1850 Calculus I and MATH:1860 Calculus II. Advanced
placement credit, CLEP credit, and credit earned through the
Mathematics Incentive Program are accepted for part or all of
the calculus requirement. Students complete the following
core courses.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:1850 &amp; MATH:1860</td>
<td>Calculus I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:2150</td>
<td>Foundations of Geometry</td>
<td>3</td>
</tr>
<tr>
<td>MATH:2700</td>
<td>Introduction to Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH:2850</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH:3720</td>
<td>Introduction to Abstract Algebra I</td>
<td>4</td>
</tr>
<tr>
<td>MATH:3770</td>
<td>Fundamental Properties of Spaces and Functions I</td>
<td>4</td>
</tr>
<tr>
<td>MATH:4050</td>
<td>Introduction to Discrete Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>or MATH:4060</td>
<td>Discrete Mathematical Models</td>
<td></td>
</tr>
<tr>
<td>CS:1210</td>
<td>Computer Science I: Fundamentals</td>
<td>4</td>
</tr>
<tr>
<td>STAT:3120</td>
<td>Probability and Statistics</td>
<td>4</td>
</tr>
</tbody>
</table>

More advanced courses may be substituted for the core
courses with Department of Mathematics approval.

Program B: Electives

Students in Program B must take at least three additional
Department of Mathematics post-calculus courses (9-12
s.h.), including two chosen from MATH:3900 Introduction to
Mathematics Research and courses numbered 4000 or above,
excluding MATH:4010 Basic Analysis and MATH:4020 Basic
Abstract Algebra. The post-calculus courses must be chosen
avoiding duplication and regression with the core math
courses, particularly when engineering mathematics courses
are considered. With the department’s approval, capable
students are encouraged to substitute more advanced
courses in the same subject area for any of the electives. The
Department of Mathematics website offers advice on course
selection.

Teacher Licensure

Students interested in teaching in elementary and/or
secondary schools should seek admission to the Teacher
Education Program (TEP) in the College of Education.

To qualify for licensure in secondary teaching, students in
the TEP complete a degree in education as well as a related
College of Liberal Arts and Sciences degree. See Apply on the
College of Education website for details on requirements and
deadlines for applying to the College of Education and about
TEP choices of majors leading to licensure.

Students who wish to earn teacher licensure should choose
Program B; see “Program B” above.

Program C

The Department of Mathematics encourages students of other
majors to take more mathematics courses and attempt a BA
or BS secondary major, or a secondary degree if their first
major is outside CLAS, in mathematics. Program C offers a
curricular path to achieve this goal.

Program C enables students to specialize in a mathematics-
related subtrack, such as the mathematics of biochemistry,
biomathematics, biostatistics, chemistry, computer science,
data science, economics, engineering (all departments),
finance, physics, risk management and insurance, and
statistics and actuarial science. In consultation with the
faculty advisor, students build on the Program C core
to prepare a subtrack plan of study tailor-made to their interests
and academic or career goals. The proposed study plan must
be approved by the Department of Mathematics.

Students must file their subtrack plan of study before they
begin their senior year; they use the Program C Plan of Study
form, available on the Department of Mathematics website.
The website has templates for choosing electives in several
areas; students may use these or propose other plans.

Program C: Core Courses

Students must complete a two-semester sequence of
MATH:1850 Calculus I and MATH:1860 Calculus II. Advanced
placement credit, CLEP credit, and credit earned through the
Mathematics Incentive Program are accepted for part or all of
the calculus requirement. Students complete the following
core mathematics courses.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:1850 &amp; MATH:1860</td>
<td>Calculus I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:2700</td>
<td>Introduction to Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH:2850</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>One additional &quot;proofs&quot; course such as MATH:3720 or MATH:3770</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

More advanced courses may be substituted for the core
courses with Department of Mathematics approval.
Program C: Electives

Students choose at least eight approved electives. All electives must be offered for 3-4 s.h. of credit. At least four of the electives must be mathematics courses (prefix MATH): MATH:3600 Introduction to Ordinary Differential Equations or above, but excluding MATH:3700 Introduction to Matrix Theory, MATH:3750 Classical Analysis, MATH:3995 through MATH:3997, MATH:4010 Basic Analysis, MATH:4020 Basic Abstract Algebra, and MATH:4120 History of Mathematics. Independent study, reading, topics, seminar, and project courses are not allowed unless approved by the Department of Mathematics in advance. Of these four math courses, at least two courses must be upper-level mathematics courses. See "Post-Calculus Mathematics Requirement" and "Upper-Level Mathematics Requirement" above.

Some subtracks require additional required courses beyond the five core mathematics courses (see "Program C: Core Courses" above). These additional courses count toward electives; some may be from other departments. For a list of suggested subtracks and restrictions on electives as well as the additional required courses (if any) in each subtrack, consult the Department of Mathematics website.