Mathematics, B.S.

Bachelor of Science students majoring in mathematics enroll in one of three programs: Program A is for students who plan to work in business or government or pursue graduate study in mathematics; program B is for students who seek secondary school teaching licensure; and program C is for those seeking specialization in a mathematics-related area, such as actuarial science, biomathematics, business, computer science, economics, physics, statistics, and so forth. Program C may be especially appropriate for students who plan to seek a mathematics-related job after earning a bachelor's degree, rather than going on to graduate study.

B.S. with Second Major

Students majoring in mathematics may choose to earn a second major in computer science, statistics, actuarial science, or other disciplines. They must satisfy all requirements of program A, program B, or program C in mathematics as well as all requirements for the second major. For more information, consult an advisor and see Declaring or Changing a Major on the College of Liberal Arts and Sciences website.

Transfer from Engineering to Mathematics


Requirements

The Bachelor of Science with a major in mathematics requires a minimum of 120 s.h., including at least 45-47 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 g.p.a. 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 General Education Program.

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 Current 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.

The department's Handbook for Undergraduate Majors 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 University of Iowa and Department of Mathematics websites.

The B.S. with a major in mathematics (program A, B, or C) requires the following course work.

<table>
<thead>
<tr>
<th>Program Requirements (semester hours vary in program A, B, or C selection)</th>
<th>45-56</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Hours</td>
<td>45-56</td>
</tr>
</tbody>
</table>

Post-Calculus Mathematics Requirement

Students majoring in mathematics must earn at least 15 s.h. in post-calculus mathematical sciences courses offered by the University of Iowa; students may not count transfer courses or credit by exam toward this requirement. At least 12 s.h. of the required 15 s.h. in post-calculus courses must be earned in Department of Mathematics courses (prefix MATH) or in courses cross-listed with the department.

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

- MATH:3700 Introduction to Matrix Theory
- MATH:3750 Classical Analysis
- MATH:3995 Topics in Mathematics
- MATH:3996 Individual Study and Honors in Mathematics
- MATH:3997 Readings in Mathematics
- MATH:4010 Basic Analysis
- MATH:4020 Basic Abstract Algebra

Post-calculus courses offered by the Department of Computer Science, and the Department of Statistics and Actuarial Science must have a calculus prerequisite.

Upper-Level Mathematics Requirement

Mathematics majors must take at least two upper-level mathematics courses for the B.S. degree. Upper-level mathematics courses include MATH:3900 Introduction to Mathematics Research and courses numbered 4000 or above, excluding these:

- MATH:4010 Basic Analysis
- MATH:4020 Basic Abstract Algebra
- MATH:4120 History of Mathematics

No courses from other departments can be counted as upper-level mathematics courses, unless they are cross-listed 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 calculus I-II. Advanced placement credit, CLEP credit, and credit granted through the Mathematics Incentive Program is accepted for all or part of the calculus requirement.

Students complete the following core courses.

| MATH:1850 & MATH:1860 | Calculus I-II | 8 |
### Mathematics

**Program A: Electives**

Students complete six electives (18-24 s.h.), including at least three upper-level mathematics courses.

**Mathematics**

Students may choose from mathematics courses numbered MATH:2150 Foundations of Geometry, MATH:3800 Elementary Numerical Analysis 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:2111 Programming Practice, CS:3210 Programming Languages and Tools, CS:3910 Informatics Project, CS:3980 Topics in Computer Science I, and CS:3990 Honors in Computer Science or Informatics.

**Statistics and Actuarial Science**


Among the courses listed above, only one of the following three courses, STAT:2020, STAT:3100, or STAT:3120 can be counted; although none of these courses can be counted if taken after STAT:4100.

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

Consult the department's Handbook for Undergraduate Majors 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 "B.S. with Teacher Licensure" below.

**Program B: Core Courses**

Students must complete a two-semester sequence of calculus I-II. Advanced placement credit, CLEP credit, and credit earned through the Mathematics Incentive Program is 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>Credits</th>
</tr>
</thead>
<tbody>
<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:3600</td>
<td>Introduction to Ordinary Differential Equations</td>
<td>3</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>
</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 Handbook for Undergraduate Majors offers advice on course selection.

**B.S. with Teacher Licensure**

Mathematics majors interested in earning licensure to teach in elementary and/or secondary schools must complete the College of Education’s Teacher Education Program (TEP) in addition to the requirements for the major and all requirements for graduation. The TEP requires several College of Education courses and student teaching. Contact the Office of Student Services for details.

Students must satisfy all degree requirements and complete Teacher Education Program licensure before degree conferral.

Students majoring in mathematics who wish to earn teacher licensure should choose program B in the mathematics major; see "Program B" above.

**Program C**

Program C enables students to specialize in a mathematics-related subtrack, such as the mathematics of making optimal business decisions, risk management and insurance, economics, finance, physics, chemistry, biostatistics, biomathematics, computer science, statistics and actuarial science, or all departments within the College of Engineering. In consultation with the faculty advisor, students build on the Program C core to prepare a subtrack plan of study tailored 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 at the Department of Mathematics website.
The Handbook for Undergraduate Majors 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 calculus I-II. Advanced placement credit, CLEP credit, and credit earned through the Mathematics Incentive Program is accepted for part or all of the calculus requirement. Students complete the following core math courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:1850 &amp;</td>
<td>Calculus I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:1860</td>
<td></td>
<td></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>
</tbody>
</table>

One additional "proofs" course such as

MATH:3720 or MATH:3770

Some subtracks require additional core courses from other departments; consult the Handbook for Undergraduate Majors or the Department of Mathematics website. Additional non-math core courses count toward electives (see "Program C: Electives" below). Students who specialize in engineering should consult the Department of Mathematics.

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

**Program C: Electives**

Students choose eight or nine approved electives. All electives must be offered for 3-4 s.h. of credit. At least three of the electives must be post-calculus mathematics courses (prefix MATH). All B.S. mathematics majors must take 15 s.h. of post-calculus mathematics courses and at least two upper-level mathematics courses; see "Post-Calculus Mathematics Requirement" and "Upper-Level Mathematics Requirement" above.

Some subtracks require additional core courses from other departments (see "Program C: Core Courses" above); the additional non-math core courses count toward electives. For a list of suggested subtracks and restrictions on electives in each subtrack, consult the Handbook for Undergraduate Majors or the Department of Mathematics website.

**Honors**

**Honors in the Major**

Students majoring in mathematics have the opportunity to graduate with honors in the major. Departmental honors students must complete all requirements for the major and must maintain a g.p.a. of at least 3.40 in the major and overall. To graduate with honors in the major, they must complete one of the options below.

Option 1: complete four of the courses below, including a two-course sequence, with a B average for the four courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:4090</td>
<td>A Rigorous Introduction to Abstract Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH:4210</td>
<td>Foundations of Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH:5000 &amp;</td>
<td>Abstract Algebra I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:5010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH:5200 &amp;</td>
<td>Introduction to Analysis I-II</td>
<td>8</td>
</tr>
<tr>
<td>MATH:5210</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Option 2: complete an honors project comparable to taking several of the courses above, approved by the mathematics honors advisor and the thesis supervisor. Students who choose this option typically register for MATH:3996 Individual Study and Honors in Mathematics for 3 s.h. or more. They must find a faculty member willing to supervise their project; contact the department for help finding a project supervisor. Contact the Department of Mathematics honors advisor for more information.

**University of Iowa Honors Program**

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the University’s honors program. Honors in mathematics is awarded by the Department of Mathematics and is separate from the University of Iowa Honors Program. Membership in the UI Honors Program is not required to earn honors in the mathematics major. However, honors in mathematics can be applied toward UI Honors Program requirements.

**Academic Plans**

**Four-Year Graduation Plan**

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the University’s Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.

Note: Many mathematics courses must be taken in sequence, so students must begin major requirements as early as possible, and individual plans of study must be constructed carefully. The mathematics major typically requires 13 or 14 courses for Bachelor of Science students. Students must choose program A, B, or C by the end of the third semester and must remain in their chosen program until they graduate in order to stay on track for the four-year graduation plan.

**Before the third semester begins:** course work in the major through second-semester calculus

**Before the fifth semester begins:** three or four more courses in the major

**Before the seventh semester begins:** three or four more courses in the major and at least 90 s.h. earned toward the degree
Before the eighth semester begins: two or three more courses in the major

During the eighth semester: enrollment in all remaining course work in the major, all remaining General Education courses, and a sufficient number of semester hours to graduate

Sample Plan of Study
Mathematics (B.S.)

Program A

Course | Title | Hours
--- | --- | ---
First Year | | |
Fall | | |
MATH:1850 | Calculus I | 4
RHET:1030 | Rhetoric (GE: Rhetoric or other General Education course) | 4
GE: World Languages or elective course | 3-5
CSI:1600 | Success at Iowa (required) | 2
Elective course | 2
| Hours | 15-17
Spring | | |
MATH:1860 | Calculus II | 4
MATH:2700 | Introduction to Linear Algebra | 4
ENGL:1200 | The Interpretation of Literature (GE: Interpretation of Literature) | 3
GE: World Languages or elective course | 3-5
Elective course | 1
| Hours | 15-17
Second Year | | |
Fall | | |
MATH:2850 | Calculus III | 4
MATH:3600 | Introduction to Ordinary Differential Equations | 3
GE: Diversity and Inclusion | 3
GE: World Languages or elective course | 3-5
Elective course | 2
| Hours | 15-17
Spring | | |
MATH:2150 | Foundations of Geometry (or another required post-calculus math elective) | 3
MATH:3720 | Introduction to Abstract Algebra I | 4
GE: Natural Sciences with a lab | 4
GE: World Languages or elective course | 3-5
Elective course | 1
| Hours | 15-17
Third Year | | |
Fall | | |
MATH:3770 | Fundamental Properties of Spaces and Functions I | 4
Major: required post-calculus math elective course | 3
GE: Historical Perspectives | 3
GE: Values and Culture | 3
Elective course | 2
| Hours | 15
Spring | | |
Major: required post-calculus math elective course | 3

Major: required post-calculus math elective course | 3
GE: Literary, Visual, and Performing Arts | 3
GE: Natural Sciences without a lab | 3
Elective course | 3
| Hours | 15

Fourth Year
Fall
Major: required upper-level math elective course | 3
Major: required upper-level math elective course | 3
GE: International and Global Issues | 3
GE: Social Sciences | 3
Elective course | 3
| Hours | 15
Spring
Elective course | 3
Elective course | 3
Elective course | 3
Elective course | 3
| Hours | 15
Total Hours | 120-128

1. General Education (GE) courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses. For more information, view the General Education Program.
2. Students who have completed four years of a single language in high school have satisfied the College of Liberal Arts and Sciences GE: World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.
3. Students may use their elective courses to complete a double major, minors, or certificates.
4. Required mathematical electives must include at least one upper-level math course (prefix MATH); some statistics and computer science courses can be included.
5. Enrollment in chemistry and math courses require completion of placement exams.

Career Advancement

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.