

# Actuarial Science, B.S.

Due to the demanding nature of the actuarial science major and the difficulty of the professional examinations, the department maintains a selective admission program for actuarial science. Students must apply and be admitted to the major.

Students interested in becoming actuaries should declare an interest in actuarial science as their major when they enter the University of Iowa. Ordinarily, students apply for admission to the actuarial science major in the fall semester of their sophomore year, after they have taken MATH:3770 Fundamental Properties of Spaces and Functions I or MATH:2850 Calculus III, and STAT:3100 Introduction to Mathematical Statistics I. Students should apply no later than the end of the spring semester of their junior year.

Students admitted to the actuarial science major usually have completed at least 40 s.h. at the University or at another postsecondary institution, including a three- or four-course calculus sequence, a course in linear algebra, and a calculus-based course in probability and statistics. The admission decision is based on a student's performance in these courses and other courses relevant to success in the major. ACT or SAT scores are considered in evaluating transfer students. Factors such as work ethic, enthusiasm, and commitment also may be considered. Students who do well in the prerequisite math courses tend to be the most successful in actuarial science.

For application forms and more information about selective admission, contact the Department of Statistics and Actuarial Science.

## Learning Outcomes

Students will:

- be able to bring to bear actuarial, financial, mathematical, and statistical techniques to model and analyze risks, particularly in the context of insurance and pension;
- have the knowledge and analytical ability to pass the initial professional actuarial examinations given by the Society of Actuaries and Casualty Actuarial Society, and develop the skills needed for successful self-study of the advanced professional examinations;
- be skillful in using and developing computer software to solve actuarial problems;
- be able to clearly communicate results from an actuarial analysis to all stakeholders, and write effective reports that describe the analysis and summarize important findings; and
- possess a basic understanding of insurance and business operations.

## Requirements

The Bachelor of Science with a major in actuarial science requires a minimum of 120 s.h., including 51 s.h. of work for the major. 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 GE CLAS Core.

The program prepares students for careers as actuaries. It also helps them learn material that is included in professional examinations administered by professional organizations such as the Society of Actuaries and the Casualty Actuarial Society.

Students take a variety of actuarial science courses. They prepare for business aspects of the actuarial profession by studying accounting, law, finance, insurance, and economics. They also complete courses that enhance important communication skills, such as writing and speaking, as part of their GE CLAS Core requirements.

## Courses Required for the Major

The B.S. with a major in actuarial science requires the following coursework. Permission to substitute coursework taken at another institution for required courses at the University of Iowa is decided case by case; students should contact the department.

Code	Title	Hours
<b>Computer Science</b>		
This course:		
CS:1210	Computer Science I: Fundamentals	4
<b>Mathematics</b>		
All of these:		
MATH:1850	Calculus I	4
MATH:1860	Calculus II	4
MATH:2700	Introduction to Linear Algebra	4
MATH:2850	Calculus III	4
MATH:3770	Fundamental Properties of Spaces and Functions I	4
<b>Statistics and Actuarial Science</b>		
All of these:		
ACTS:3080	Mathematics of Finance I	3
ACTS:4130	Quantitative Methods for Actuaries	3
ACTS:4150	Fundamentals of Short-Term Actuarial Mathematics	3
ACTS:4180	Life Contingencies I	3
ACTS:4280	Life Contingencies II	3
STAT:3100/ IGPI:3100	Introduction to Mathematical Statistics I	3
STAT:3101/ IGPI:3101	Introduction to Mathematical Statistics II	3
STAT:4100/ IGPI:4100	Mathematical Statistics I	3
STAT:4101/ IGPI:4101	Mathematical Statistics II	3

In exceptional cases, the advisor may grant permission to waive STAT:3100/IGPI:3100 Introduction to Mathematical Statistics I and/or STAT:3101/IGPI:3101 Introduction to Mathematical Statistics II.

Students may choose to complete STAT:4560 Statistics for Risk Modeling I and STAT:4561 Statistics for Risk Modeling II (both courses) instead of ACTS:4280 Life Contingencies II, except honors students, who must complete all three courses.

## Honors

### Honors in the Major

Students majoring in actuarial science have the opportunity to graduate with honors in the major. They must maintain a UI cumulative g.p.a. of at least 3.33, a g.p.a. of at least 3.40 in all departmental courses, and complete the following five courses in addition to all courses required for the major.

Code	Title	Hours
ACTS:6200	Predictive Analytics	3
FIN:3300	Corporate Finance	3
MATH:3600	Introduction to Ordinary Differential Equations	3
STAT:4560	Statistics for Risk Modeling I	3
STAT:4561	Statistics for Risk Modeling II	3

### 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.

Membership in the UI Honors Program is not required to earn honors in the actuarial science major.

## Career Advancement

Most actuaries are employed by insurance companies or employee benefits consulting firms. They have responsibilities related to all phases of product development and maintenance for their companies. Individual employers who need guidance in establishing employee insurance and retirement programs also hire actuarial science graduates. A growing number of actuaries work in asset/liability management, some in investment firms, and others in insurance companies.

Actuaries have always been in high demand and earn good salaries. Most Iowa graduates find work as actuaries, but some become financial managers and teachers. They take positions in locations all across the country, often in large metropolitan areas.

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

## 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.

Much of the coursework is sequential, so students must begin requirements for the major as soon as possible. Individual study plans must be made carefully. Students who first enroll for a spring semester must consult their advisor to confirm a four-year plan.

**Before the third semester begins:** MATH:1860 Calculus II and MATH:2700 Introduction to Linear Algebra.

**Before the fifth semester begins:** MATH:2850 Calculus III, MATH:3770 Fundamental Properties of Spaces and Functions I, STAT:3100/IGPI:3100 Introduction to Mathematical Statistics I, STAT:3101/IGPI:3101 Introduction to Mathematical Statistics II, and ACTS:3080 Mathematics of Finance I.

**Before the seventh semester begins:**

STAT:4101/IGPI:4101 Mathematical Statistics II, ACTS:4130 Quantitative Methods for Actuaries, ACTS:4150 Fundamentals of Short-Term Actuarial Mathematics, ACTS:4180 Life Contingencies I, and at least 90 s.h. earned toward the degree.

**Before the eighth semester begins:** ACTS:4280 Life Contingencies II.

**During the eighth semester:** enrollment in all remaining coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate.

### Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

### Actuarial Science, B.S.

Course	Title	Hours
<b>Academic Career</b>		
<b>Any Semester</b>		
Students apply to the Actuarial Science BS program through a selective process. Acceptance is not guaranteed. <sup>a</sup>		
GE CLAS Core: Sustainability <sup>b</sup>		
	<b>Hours</b>	<b>0</b>
<b>First Year</b>		
<b>Fall</b>		
CS:1210	Computer Science I: Fundamentals <sup>c</sup>	4
MATH:1850	Calculus I <sup>d</sup>	4
RHET:1030	Rhetoric	3 - 4
or ENGL:1200	or The Interpretation of Literature	
GE CLAS Core: World Languages First Level Proficiency or elective course <sup>e</sup>		4 - 5
CSI:1600	Success at Iowa	1
Attend the Actuarial Science, Insurance and Risk Management Job Fair during the fall semester to apply for summer internships.		
	<b>Hours</b>	<b>16-18</b>
<b>Spring</b>		
MATH:1860	Calculus II	4
MATH:2700	Introduction to Linear Algebra	4
GE CLAS Core: Diversity and Inclusion <sup>f</sup>		3
GE CLAS Core: World Languages Second Level Proficiency or elective course <sup>e</sup>		4 - 5
	<b>Hours</b>	<b>15-16</b>
<b>Second Year</b>		
<b>Fall</b>		
MATH:2850	Calculus III	4
STAT:3100	Introduction to Mathematical Statistics I <sup>g</sup>	3

ENGL:1200 or RHET:1030	The Interpretation of Literature or Rhetoric	3 - 4
GE CLAS Core: Natural Sciences without Lab <sup>f</sup>		3
GE CLAS Core: World Languages Second Level Proficiency or elective course <sup>e</sup>		4 - 5
Admission Application: apply to the Actuarial Science BS major <sup>h</sup>		
Attend the Actuarial Science, Insurance and Risk Management Job Fair during the fall semester to apply for summer internships.		

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<b>Hours</b>	<b>17-19</b>
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**Spring**

ACTS:3080	Mathematics of Finance I	3
MATH:3770	Fundamental Properties of Spaces and Functions I	4
STAT:3101	Introduction to Mathematical Statistics II <sup>i</sup>	3
GE CLAS Core: World Languages Fourth Level Proficiency or elective course <sup>e</sup>		4 - 5

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<b>Hours</b>	<b>14-15</b>
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**Third Year****Any Semester**

The curriculum shown in the third and fourth years on this plan begins upon acceptance into the Actuarial Science BS program.

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<b>Hours</b>	<b>0</b>
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**Fall**

ACTS:4130	Quantitative Methods for Actuaries <sup>g, j</sup>	3
STAT:4100	Mathematical Statistics I <sup>g</sup>	3
GE CLAS Core: Natural Sciences with Lab <sup>f</sup>		4
GE CLAS Core: Social Sciences <sup>f</sup>		3
Elective course <sup>k</sup>		3

Attend the Actuarial Science, Insurance and Risk Management Job Fair during the fall semester to apply for summer internships.

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<b>Hours</b>	<b>16</b>
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**Spring**

ACTS:4150	Fundamentals of Short-Term Actuarial Mathematics <sup>i, j</sup>	3
ACTS:4180	Life Contingencies I <sup>i, j</sup>	3
STAT:4101	Mathematical Statistics II <sup>i</sup>	3
GE CLAS Core: Historical Perspectives <sup>f</sup>		3
GE CLAS Core: Literary, Visual, and Performing Arts <sup>f</sup>		3

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<b>Hours</b>	<b>15</b>
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**Fourth Year****Fall**

ACTS:4280	Life Contingencies II <sup>g, j, l</sup>	3
STAT:4560	Statistics for Risk Modeling I <sup>k, m</sup>	3
GE CLAS Core: International and Global Issues <sup>f</sup>		3
Elective course <sup>k</sup>		3
Elective course <sup>k</sup>		3

Attend the Actuarial Science, Insurance and Risk Management Job Fair during the fall semester.

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<b>Hours</b>	<b>15</b>
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**Spring**

ACTS:6200	Predictive Analytics <sup>k, m</sup>	3
STAT:4561	Statistics for Risk Modeling II <sup>k, m</sup>	3
GE CLAS Core: Values and Culture <sup>f</sup>		3

Elective course <sup>k</sup>	3
Elective course <sup>k</sup>	3

Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall)

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<b>Hours</b>	<b>15</b>
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<b>Total Hours</b>	<b>123-129</b>
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- a The Academic Advising Center advises Actuarial Science Interest students on prerequisite course planning. Students are advised for success, based on academic strength, not necessarily for a four year plan. Prerequisites may take more than one and a half years to complete.
- b Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative and Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Culture.
- c Enrollment in this course requires completion of a placement exam.
- d Enrollment in math courses requires completion of a placement exam.
- e Students who have completed four years of a single language in high school have satisfied the GE CLAS Core World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.
- f GE CLAS Core 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.
- g Typically this course is offered in fall semesters only. Check MyUI for course availability since offerings are subject to change.
- h Ordinarily, students apply for admission to the actuarial science major in the fall semester of their sophomore year, after they have taken MATH:3770 or MATH:2850, and STAT:3100. Students should apply no later than the end of the spring semester of their junior year. For further details and application instructions, see your advisor and the Department of Statistics and Actuarial Science website.
- i Typically this course is offered in spring semesters only. Check MyUI for course availability since offerings are subject to change.
- j Restricted to Actuarial Science Majors. For further details and application instructions, see your advisor and the Department of Statistics and Actuarial Science website.
- k Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.
- l Students may choose to complete STAT:4560 and STAT:4561 (both courses) instead of ACTS:4280, except honors students, who must complete all three courses.
- m This course is a recommended elective, not a requirement. Students may choose another elective. Prerequisites may apply.
- n Please see Academic Calendar, Office of the Registrar website for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Graduation Services.