

ACTUARIAL SCIENCE

Actuaries have a deep understanding of finance, business, mathematics, and statistics. With this knowledge, they help businesses measure and manage risk, develop new products, and make strategic value-enhancing decisions. In high demand, actuaries work for and with businesses engaged in many different types of activities, including life-, health-, and property-casualty insurance, banking, investments, financial services, government, energy, e-commerce, marketing, and consulting.

Students studying actuarial science will acquire the knowledge base and skills in finance, mathematics, and statistics needed to pass the preliminary actuarial exams offered by the Society of Actuaries and Casualty Society of America, while acquiring essential business skills to be successful in the field.

Undergraduate Major

The Department of Finance in the Ivy College of Business offers a major in actuarial science. Students will complete the business general education requirements (including business foundation courses), supporting courses/major prerequisites, business core requirements for the Bachelor of Science (B.S.) degree, and 23 additional credits in the major.

The actuarial science major, intended for students with strong quantitative backgrounds and interest in business, has the goal of educating students in business and risk management, while providing the background and training needed for certification as an actuary (via the 5 preliminary exams of the profession). The major is an excellent opportunity for individuals who want to use advanced technical and analytical skills to solve important business problems.

Certificate

The certificate in actuarial science is available from the *College of Liberal Arts and Sciences* for non-actuarial science majors at Iowa State (or students who hold a baccalaureate degree from an accredited institution). The certificate requires 23 credits from a designated list of courses, of which 9 credits must stand-alone. There are 9 prerequisite courses required for the certificate's required courses.

The certificate is intended for students who wish to prepare for a career in the field while obtaining the advanced technical and analytical skills in their chosen major. Students studying mathematics, statistics, or other quantitative STEM disciplines will find their primary coursework matches well with the prerequisites and courses required for the certificate.

Students completing the certificate will have sufficient background to pass the first 4 preliminary exams of the profession, along with applying actuarial mathematics to problems in finance, investments, and risk analysis for a broad range of businesses and consumers.

For undergraduate curriculum in business, major in actuarial science.

The Department of Finance offers a major in actuarial science. Students will complete the general education requirements (including business foundation courses), supporting courses/major prerequisites, business core requirements for the Bachelor of Science (B.S.) degree, and 23 additional credits in the major.

Actuaries measure and manage risk and work for and with businesses with a financial focus, such as finance and insurance. The actuarial science program provides a background in probability, statistics, finance, and actuarial mathematics to enable students to pass the 5 preliminary exams offered by the Society of Actuaries and Casualty Society of America. After completion of this program, students will acquire the business-related skills needed to be a successful actuary. These include the ability to: understand how a business is organized and functions; communicate effectively in written, oral, visual, and electronic modes; work in teams; make ethical choices; use quantitative and analytical methods to address unstructured business problems; think critically; understand financial statements; and understand markets and investments.

Areas of study in the field of actuarial science include interest theory, theory of probability, financial futures and options, loss models, credibility theory, and mathematics of life contingencies.

The instructional objective of the Actuarial Science program is to provide a well-rounded professional business education in actuarial science.

Such a program will provide the student with:

1. A mastery of actuarial concepts and methods of analysis.
2. A basic understanding of insurance operations in a global setting and of the role of financial institutions in the economy.
3. An ability to effectively communicate and work with others as an actuary.
4. An ability to demonstrate leadership capabilities in actuarial, financial analysis, and portfolio management.

For more information on the undergraduate major in Actuarial Science, please visit: <https://www.ivybusiness.iastate.edu/academics/undergraduate-programs/actuarial-science/>. (<https://www.ivybusiness.iastate.edu/academics/undergraduate-programs/actuarial-science/>)

Student Learning Outcomes

Upon graduation, undergraduate students majoring in Actuarial Science will:

1. Be effective communicators.
2. Be effective collaborators.
3. Be problem solvers.

4. Understand business concepts.
5. Recognize ethical and legal responsibilities to organizations.

Curriculum:

While the General Education Requirements for Actuarial Science majors remains the same as all other Business majors, there are specific changes in the following areas that must be completed in order to receive a Bachelor's degree in Actuarial Science:

Foundation: (21)

BUSAD 1020	Business Learning Team Orientation or BUSAD 1030 Orientation	1
BUSAD 2030	Professional Development in Business	1
COMS 1130	Introduction to Spreadsheets and Databases	3
MATH 1650	Calculus I	4
ECON 1010	Principles of Microeconomics	3
ECON 1020	Principles of Macroeconomics	3
STAT 2260	Introduction to Business Statistics I	3
ACCT 2840	Financial Accounting	3

Supporting Courses: (17)

ACCT 2150	Legal Environment of Business	3
MATH 1660	Calculus II	4
MATH 2070	Matrices and Linear Algebra	3
MATH 2650	Calculus III	4
PHIL 2300	Moral Theory and Practice	3

Business Core: (27)

ACCT 2850	Managerial Accounting	3
ENTSP 3100	Entrepreneurship and Innovation	3
FIN 3010	Principles of Finance	3
MGMT 3710	Organizational Behavior	3
MGMT 3720	Ethical and Responsible Management	3
MIS 3010	Management Information Systems	3
MKT 3400	Principles of Marketing	3
SCM 3010	Supply Chain Management	3

Above courses are prerequisites and must be taken prior to:

MGMT 4780	Strategic Management	3
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Major – Actuarial Science: (23)

Required Courses:

MATH 2400	Mathematics of Investment and Credit	3
STAT 3410	Introduction to the Theory of Probability and Statistics I	4
STAT 3420	Introduction to the Theory of Probability and Statistics II	4

FIN 4550	Risk Modeling	3
ACSCI 4010	Loss Models I	3
ACSCI 4020	Credibility Theory	3
MATH 4410	Life Contingencies I	3

Elective Courses:

The following electives are highly recommended for Actuarial Science majors:

ACSCI 3910	Actuarial Exam P Lab	1
ACSCI 3920	Actuarial Exam FM Lab	1
FIN 3100	Corporate Finance	3
FIN 4240	Financial Futures and Options	3
MATH 4420	Life Contingencies II	3

Students are limited to three business majors/degrees/minors within the Ivy College of Business. This limit is on business majors/degrees/minors only and does not apply to multiple majors/degrees/minors taken outside the Ivy College of Business.

Actuarial Science, B.S.

Sample 4-Year Plan (Your plan may differ)

Freshman

Fall	Credits Spring	Credits
BUSAD 1020 or 1030	1 ACCT 2840*	3
ECON 1010*	3 ECON 1020*	3
COMS 1130	3 MATH 1660	4
ENGL 1500	3 HUM/SOC SCI	3
MATH 1650	4 STAT 2260	3
PHIL 2300	3 BUSAD 2030	1
	17	17

Sophomore

Fall	Credits Spring	Credits
ACCT 2850	3 Business Core Course	6
MATH 2400	3 STAT 3410	4
MATH 2650	4 ENGL 2500	3
FIN 3010*	3 Global/International Perspective@	3
Recommended ACSCI elective from list	1 LIB 1600	1
(Students should take FM exam during winter break)	(Students should take P exam summer after sophomore year)	

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Junior		
Fall	Credits Spring	Credits
MATH 2070	3 FIN 4550	3
ACSCI 4010	3 ACSCI 4020	3
Business Core Course	3 STAT 3420*	4
SPCM 3120	3 Business Core Course	3
Natural Science	3 U.S. Cultures and Communities [#] (Students should take IFM (or STAM) exam summer after junior year)	3
15		16

Senior		
Fall	Credits Spring	Credits
MATH 4410	3 Global/International Perspective [@]	3
Business Core Courses	3 ACCT 2150	3
ENGL 3020	3 MGMT 4780**	3
HUM/SOC SCI	3 General Elective	3
Recommended ACSCI elective from list (Students should take STAM (or IFM) exam during winter break)	2 (Students should take LTAM exam)	
14		12

Total Credits: 122

@Courses in these requirements may also be used as Global Perspective.

U.S. Cultures and Communities courses may be used to satisfy HUM/SOC SCI.

* Validation of Educational Experience courses

**Must have credit or enrollment in all core courses listed above, except for MGMT 3720, plus senior standing, in order to enroll in MGMT 4780.

FM# Financial Mathematics exam

P = Probability exam

IFM# Investments & Financial Markets exam

STAM# Short-Term Actuarial Mathematics exam

LTAM# Long-Term Actuarial Mathematics exam

Graduation Requirements:

1. Grade of "C" or higher in at least 30 credits of Core and Major courses.

2. 42 credits of 3000+ level courses from a four-year institution.

3. 50% of required Business courses must be earned at ISU.

4. At least 32 credits and the LAST 32 credits must be earned at ISU (exceptions for study abroad and internship may be requested).

5. 131 Credits minimum and a Cumulative GPA of at least 2.00 with no quality point deficiencies.

6. A grade of C or better in ENGL 2500 required, and also in one other required ENGL course.

7. A grade of C- or better in MATH 1660 and MATH 2650 required.

8. All 3000-level and higher business credits must be earned at a four-year college.

9. Multiple business **majors** must have at least 15 distinct credits in each of the major requirements; when applicable, one course can be shared between business majors; see your advisor regarding multiple business **degree requirements**.

Undergraduate Certificate

For the undergraduate certificate in actuarial science.

Purpose

The College of Liberal Arts and Sciences offers a certificate in Actuarial Science. It is available to any non-Actuarial Science major (or student who holds a baccalaureate degree from an accredited institution). Students studying mathematics, statistics, or other quantitative STEM disciplines will find their primary coursework matches well with the prerequisites and courses required for the certificate. The certificate provides students with the necessary background in mathematics, statistics, and the basic principles of finance for a career in actuarial science while obtaining advanced technical and analytical skills in their chosen major. Students completing the certificate will have the background to pass 4 of the preliminary exams in the profession, will have obtained the specialized knowledge required for success in the field, and will be prepared to work for and with businesses with a financial focus, such as insurance, banking, and investments.

Learning Outcomes

After completing the certificate in actuarial science, students will:

- Master the quantitative and analytical skills required to obtain an entry-level position in the profession,
- Have sufficient background to pass the first 3 or 4 professional exams offered by the professional actuarial organizations,
- Apply actuarial mathematics to problems in finance, investment, and risk analysis, and
- Demonstrate the ability to communicate the results of quantitative analysis, both in writing and orally.

Requirements

The certificate in actuarial science requires the completion of 7 courses, totaling 23 credit hours.

These courses are:

FIN 3200	Investments	3
FIN 4240	Financial Futures and Options	3
MATH 2400	Mathematics of Investment and Credit	3
MATH 4410	Life Contingencies I	3
MATH 4420	Life Contingencies II	3
STAT 3410	Introduction to the Theory of Probability and Statistics I	4
STAT 3420	Introduction to the Theory of Probability and Statistics II	4

The seven courses in the list above require 9 prerequisite courses. These courses are: ACCT 2840, ECON 1010, FIN 3010, MATH 1650, MATH 1660, MATH 2650, MATH 2070 or 3170, STAT 2260 (or another introductory statistics course: STAT 1010, 1040, 1050, 2010, 2310, 3050, 3220 or 3300), and STAT 3260 (or STAT 3010).

In order to be admitted to the certificate program, students must complete ACCT 2840, ECON 1010, MATH 1650, MATH 1660, and STAT 2260 (or another introductory statistics course) with a cumulative GPA of at least 2.5.

At least 9 credits used for the certificate cannot be used to meet any other department, college or university requirement for the baccalaureate degree except to satisfy the total credit requirement for graduation and to meet credit requirements in courses numbered 3000 or above.

Courses for the certificate cannot be taken on a pass/not-pass basis.

A cumulative GPA of at least 2.0 is required in the seven courses for the certificate.