# University of Iowa (UI) Courses and Society of Actuaries (SOA) Examinations

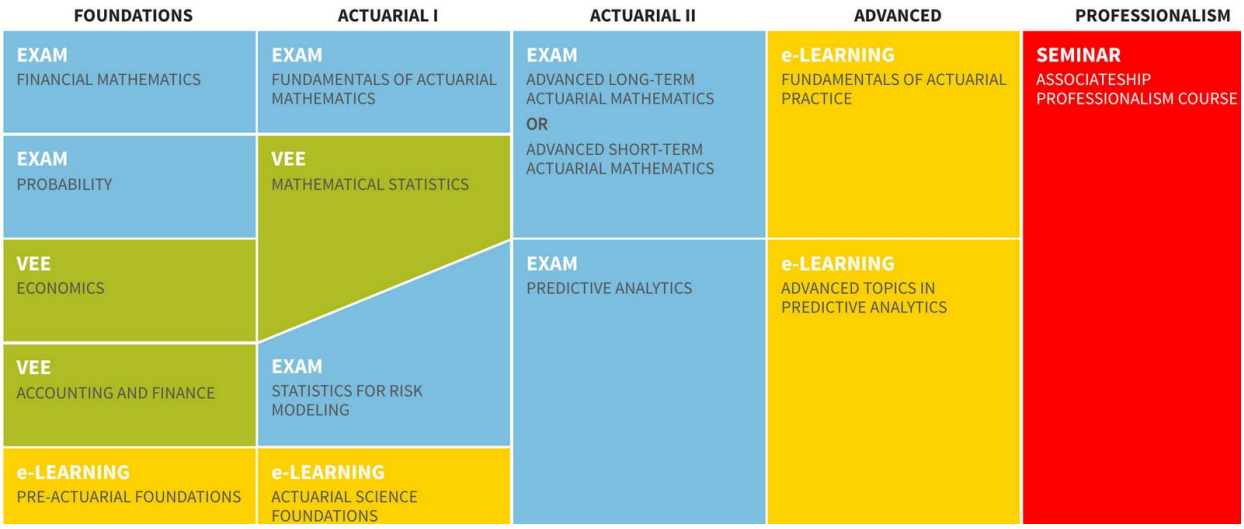
"In the forefront of actuarial folklore stands the belief that the actuarial examinations constitute a mystery impenetrable by mortal man. Perhaps the vitality of this myth may be ascribed to the undeniable attraction it holds for the successful Fellow."

*Transactions of the Society of Actuaries* Volume 1 (1949) page 42

"It is evident that the University of Iowa offers an excellent and well-rounded actuarial science education, providing students with both the necessary theoretical knowledge and practical industry experience."

Society of Actuaries Centers of Actuarial Excellence Evaluation Committee's letter, January 6, 2025

The diagram below shows the requirements for the associateship credential of the SOA.




## Required courses for the B.S. degree in Actuarial Science

For the BS degree in Actuarial Science, students are to take the following courses, in addition to those for General Education requirements.

- ACTS:3080 Mathematics of Finance I (3 s.h.)
- ACTS:4130 Quantitative Methods for Actuaries (3 s.h.)
- ACTS:4150 Fundamentals of Short-term Actuarial Mathematics (3 s.h.)
- ACTS:4180 Life Contingencies I (3 s.h.)
- ACTS:4280 Life Contingencies II (3 s.h.)
- CS:1210 Computer Science I: Fundamentals (4 s.h.)
- MATH:1850 Calculus I (4 s.h.)
- MATH:1860 Calculus II (4 s.h.)
- MATH:2700 Introduction to Linear Algebra (4 s.h.)
- MATH:2850 Calculus III (4 s.h.)
- MATH:3770 Foundations of Analysis (4 s.h.)
- STAT:3100 Introduction to Mathematical Statistics I (4 s.h.)
- STAT:3101 Introduction to Mathematical Statistics II (3 s.h.)
- STAT:4100 Statistical Inference I (3 s.h.)
- STAT:4101 Statistical Inference II (3 s.h.)

The requirement of ACTS:4280 can be replaced by taking ***both*** STAT:4560 Statistics for Risk Modeling I and STAT:4561 Statistics for Risk Modeling II. In exceptional cases, the advisor may waive STAT:3100 and/or STAT:3101. STAT:3120 is not sufficiently rigorous to be a replacement for STAT:3100 and 3101.

The required MATH courses above would qualify a student for a Minor in Mathematics; also, the student can get a B.A. degree in Mathematics (Data Sciences Subprogram) by taking three more MATH courses – MATH:3600, MATH:3800 and an upper-level MATH course. (MATH:3600 is definitely helpful for life contingencies and quantitative finance.) For satisfying the General Education requirements in Natural Sciences, calculus-based courses such as PHYS:1701, 1702 are recommended.

### Graduation with Honors in Actuarial Science

To graduate with Honors in Actuarial Science, a student must complete the following five courses in addition to all courses required for the major (including ACTS:4280). Also, the student must maintain a GPA of at least 3.40 in departmental courses and a UI cumulative GPA of 3.33.

- ACTS:6200 Predictive Analytics (3 s.h.)
- FIN:3300 Corporate Finance (3 s.h.)
- MATH:3600 Introduction to Ordinary Differential Equations (3 s.h.)
- STAT:4560 Statistics for Risk Modeling I (3 s.h.)
- STAT:4561 Statistics for Risk Modeling II (3 s.h.)

In some circumstances, the advisor may permit substitution.

### Correspondence between SOA exams and UI courses

| **SOA Examinations** | **UI Courses** |
|---|---|
| Financial Mathematics (FM) | ACTS:3080; ACTS:3210 |
| Probability (P) | STAT:3100 and/or 4100; ACTS:3110 |
| Fundamentals of Actuarial Mathematics (FAM) | ACTS:4130, 4150 and 4180; STAT:4101 |
| Advanced Long-term Actuarial Mathematics (ALTAM) | ACTS:4180 and 4280; STAT:4101 |
| Statistics for Risk Modeling (SRM) | STAT:4101, 4560 and 4561 |
| Predictive Analytics (PA), which is about computer applications of the theory in SRM. | ACTS:6200 |

### SOA's Validation by Educational Experience (VEE) Requirements

The following table shows how SOA's VEE requirements can be satisfied by UI courses (B– grade or higher), Advanced Placement Examinations (grade 4 or 5), or College Level Examination Program Tests (grade between 53 and 80).

| **VEE** | **UI Courses** | AP Exams | CLEP Tests |
|---|---|---|---|
| Accounting & Finance | ACCT:2100, FIN:3300 | | Financial Accounting |
| Economics | ECON:1100, 1200 **or** ECON:3100, 3150 | Micro, Macro | Micro, Macro |
| Mathematical Statistics | STAT:3101 **or** 4101 **or** 5101 | | |

The SOA may accept courses taken at other universities or community colleges. More information about VEE can be found in
https://www.soa.org/education/exam-req/edu-vee/
https://www.soa.org/education/exam-req/resources/edu-vee-approval-faq/

## A Sample Plan

Below is a sample plan of study for the B.S. degree in Actuarial Science for a student who needs to start from Calculus I. General Education Requirement courses are not shown. Although the courses in red are not required for the B.S. degree, you are encouraged to take them.

| Year | Fall Semester | Spring Semester |
|---|---|---|
| **1** | ACTS:1001 Introductory Seminar Actuarial Science<br>CS:1210 Computer Science I: Fundamentals<br>MATH:1850 Calculus I | ACTS:1001 Introductory Seminar Actuarial Science<br>MATH:1860 Calculus II<br>MATH:2700 Introduction to Linear Algebra |
| **2** | MATH:2850 Calculus III<br>STAT:3100 Introduction to Mathematical Statistics I | ACTS:3080 Mathematics of Finance I<br>MATH:3770 Foundations of Analysis<br>STAT:3101 Introduction to Mathematical Statistics II |
| **3** | ACTS:4130 Quantitative Methods for Actuaries<br>STAT:4100 Statistical Inference I | ACTS:4150 Fundamentals of Short-term Actuarial Mathematics<br>ACTS:4180 Life Contingencies I<br>STAT:4101 Statistical Inference II |
| 4 | ACTS:4280 Life Contingencies II<br>STAT:4560 Statistics for Risk Modeling I | ACTS:6200 Predictive Analytics<br>STAT:4561 Statistics for Risk Modeling II |

**Notes**

(i) ACTS:3080, a UEC course, is offered each fall and spring. Freshmen should **not** take ACTS:3080 in their first semester. They can take it in any of the subsequent semesters provided they satisfy the pre-requisite, which is B- or better in Calculus II.

(ii) ACTS:3110, 4130, 4150, 4180, 4280, 6200, and STAT:3100, 3101, 4100, 4101, 4560, 4561 are offered only once each year. The business college courses, ACCT:2100 and FIN:3300, are usually offered in fall, spring, and summer semesters; they may also be offered in Distance and Online Education (DOE) mode. For satisfying SOA's VEE requirements, online courses are okay.

(iii) For actuarial science majors, ACTS:3080 serves as pre-requisite for FIN:3300; there is no need to take FIN:3000. FIN:3300 satisfies the SOA VEE corporate finance requirement. Use the form https://students.tippie.uiowa.edu/undergraduates/academics/advising/non-tippie-students/enroll-request For the question "I have checked the course prerequisites on MYUI and I have met them" answer Yes. The additional information you provide is that you are an Actuarial Science Major and have taken ACTS:3080.

(iv) Exams FM and P, easiest of all actuarial examinations, are offered **six** times each year. Exam P is offered in January, March, May, July, September, and November, and FM in February, April, June, August, October, and December. These two exams are not ordered; you can write P before FM, or FM before P. There is no public record of how many times a student has attempted an actuarial examination; in other words, failing an actuarial exam has no penalty other than the exam fee. These are multiple-choice examinations; you can always be lucky. The nearest Prometric Test Center is in Hiawatha. ACTS:3110 is a one semester-hour pass/fail prep course for Exam P.

(v) The SOA has granted us **University-Earned Credit** (UEC) status for four exams: FM (ACTS:3080), FAM (ACTS:4130 & 4150), ALTAM (ACTS:4280), and SRM (STAT:4560 & 4561). To obtain UEC exemption for an exam, a student must score at least 85% in the corresponding university course(s). More information about SOA's UEC program can be found in https://www.soa.org/education/resources/uec/uec-program/

## Second Majors

Most Actuarial Science students would graduate with a second major, usually in Mathematics (Data Sciences Subprogram) or Statistics or even both. For a second major in Mathematics (Data Sciences Subprogram), you take three more MATH courses - MATH:3600, MATH:3800, and an upper-level MATH course. MATH:3600 is useful for life contingencies and quantitative finance. With respect to getting a major in Statistics, you should be aware that because all new ASA's will have to pass Exams FAM, SRM, PA, and ATPA, they will have mastered an enormous amount of statistics; the BS degree in Statistics may not have as much value to actuarial employers as before. The course STAT:3200 Applied Linear Regression is mostly a subset of STAT:4560; you should take both 4560 and 4561 for Exam SRM. The course STAT:3210 Experimental Design and Analysis is not useful to most actuaries.

Other second majors that you may want to consider include Data Science, Finance, and Risk Management & Insurance, which is a new degree offered by the Vaughan Institute of Risk Management and Insurance in Tippie College of Business. Many Actuarial Science students seek a certificate, not a major, in Risk Management & Insurance. There is a U2G Data Science program if you are interested in an MS degree in Data Science.

The MATH courses required for the BS degree in Actuarial Science should entitle you to a Minor in Mathematics unless many of your math courses are not from UI. Other Minors that you may want to consider include Business Administration and Computer Science.

**Gamma Iota Sigma** is an international risk management, insurance and actuarial science collegiate fraternity. The Beta Alpha Chapter at UI was chartered in April 2007. Wikipedia reports that the fraternity has 100 chapters and 5,000 active members.

## Actuarial Alumni

UI has the second oldest actuarial science program in the U.S.A. It began with the course "The Mathematical Theory of Insurance," taught by Dr. Westfall, in academic year 1902/1903. Since 1913, actuarial science courses have been taught every year at UI.
Five past presidents of the SOA and two past presidents of the Casualty Actuarial Society (CAS) were UI students. The current SOA president-elect, Dave Dillon, is also a UI alumnus.
In 2009 the SOA established the "Center of Actuarial Excellence" designation; UI was among the first group of universities given this honor. In 2022 the SOA granted UI the University-Earned Credit (UEC) status for four examinations.
The total number of new Fellows of the SOA (FSA) from 2000 to 2024 was 18,492, of which 371 were UI students. In other words, in these 25 years UI has 'produced' 2.01% of all new FSA's. The number of new Fellows of the CAS (FCAS) from UI in these 25 years was 56. Thus, on the average, UI has been 'producing' about 17.1 new Fellows (FSA + FCAS) each year in the past two and half decades. Names of credentialed UI alumni can be found in

https://stat.uiowa.edu/associates-society-actuaries-asa
https://stat.uiowa.edu/fellows-society-actuaries-fsa
https://stat.uiowa.edu/associates-casualty-actuarial-society-acas
https://stat.uiowa.edu/fellows-casualty-actuarial-society-fcas

## Employment

Our annual **Actuarial Science, Insurance and Risk Management Career Fair** is usually held in September, with several dozen employers attending. The date for 2025 is September 17. Many companies would not hire students with no actuarial exams passed. It will be helpful if you have passed some exam(s) by then. Below is a schedule you should consider.

| | |
|---|---|
| By the start of the sophomore year | Exam FM passed if ACTS3080 taken in Spring of freshman year |
| By the start of the junior year | Exams FM and P passed |
| By the start of the senior year | Exams FM, P and FAM passed |

UI's Pomerantz Career Center has a website summarizing employment data, such as starting salaries, of UI's recent graduates. https://careers.uiowa.edu/post-grad-data#employment-report Below are some starting salary statistics of UI Actuarial Science students who graduated between Summer 2021 and Spring 2024.

| Minimum | Median | Maximum |
|---|---|---|
| $68,000 | $79,000 | $110,000 |

The **median starting** salaries of our Actuarial Science graduates have always been higher than those in other majors and programs in the College of Liberal Arts & Sciences and College of Business. Actuarial salaries are determined by the number of professional examinations passed.
More actuarial salary information can be found in https://www.dwsimpson.com/about/salary-survey/

On March 13, 2024, the SOA Centers of Actuarial Excellence Evaluation Committee sent us a letter renewing our CAE/UEC designation. In the letter, the Evaluation Committee "commends Iowa on the outstanding job placement and exam passing rate …"

"In 2020 Iowa's insurance industry output as a percentage of the state's total Gross Domestic Product (GDP) was 11.00%, ranking it highest among the 50 states. … As of October 4, 2021, Iowa has 209 domiciled insurers. … insurance industry annual economic activity of over $18.6 billion in 2020. **…** The insurance industry is recession-resistant." *Iowa Economic Development Authority*

"The risk management and insurance industry is the largest non-agricultural economic sector in Iowa and makes up 11% of the state's economy" https://tippie.uiowa.edu/news/2024/08/tippie-secures-martin-grace-university-transformational-hire-rmi

Below is a diagram from an alumnus at Principal®. It shows various areas where an actuary may work.