

# ACTUARIAL SCIENCE

UNIVERSITY OF ST. THOMAS, COLLEGE OF ARTS AND SCIENCES



## **About actuarial science**

Actuarial science applies mathematical skills to areas of business. Actuaries use mathematical skills to create and manage programs that reduce the adverse financial impact of life's expected and unexpected events, including financial risks from investment.

Actuarial science is consistently rated as one of the best career fields. Insurance companies employ actuaries in all phases of operation, including management, marketing, investments, accounting, administration and selection of risks. Many actuaries work for consulting firms that advise insurance companies, and some provide pension advice to corporations, labor unions and government agencies. An actuarial specialization in mathematics, which includes a good background in statistics, also provides good preparation for nonactuarial careers in fields such as banking and finance.

Entry-level actuaries generally earn a higher average income than most college graduates – an income edge that is maintained throughout the actuary's career. Actuarial science graduates choose their career paths as actuaries because the profession allows them to use their mathematical abilities and communication skills; it also is a challenging and demanding career that involves solving important and interesting problems. The need for well-qualified actuaries and the scope of what actuaries do are both expected to grow.

Becoming an actuary requires good mathematical aptitude, but you don't have to be a genius in theoretical mathematics. You need to have an inquisitive mind – and the ability to think both logically and creatively – along with sound judgment and strong oral and written communication skills.

## **The actuarial science program at St. Thomas**

The actuarial science program is demanding, and actuarial exams required for professional designation are difficult; therefore, it is strongly suggested that prospective majors have a minimum math GPA of 3.0. Most students who have been successful in this program and the actuarial examinations have had GPAs considerably higher than 3.0.

Because actuaries often work at high levels within their companies or as consultants for others, there is significant value placed on an education that emphasizes breadth of knowledge as well as skills in writing and communication. The liberal arts programs at the University of St. Thomas provide an ideal environment for such development. Within that environment, the

Department of Mathematics offers a B.S. degree in actuarial science, which includes courses in mathematics, actuarial science, computer science, business administration and economics, all of which will help prepare you for a career as an actuary and for the related professional examinations. Students also are encouraged to take a broad range of electives. For example, courses in history, science, economics, communications and sociology provide important perspectives from which actuarial problems can be viewed.

### **Major requirements**

Mathematics (seven required courses)

- MATH 113, 114 (Calculus I, II)
- MATH 200 (Multi-Variable Calculus)
- MATH 240 (Linear Algebra)
- MATH 313 (Probability)
- MATH 314 (Mathematical Statistics)
- One of: MATH 333 (Applied Statistical Methods: Regression, Time Series, Forecasting); MATH 385 (Mathematical Methods of Numerical Analysis); ACSC 464 (Mathematical Finance)

Actuarial Science (four required courses)

- ACSC 264 (Theory of Interest)
- ACSC 320 (Risk Management and Insurance)
- ACSC 351 (Foundations of Actuarial Mathematics)
- ACSC 352 (Actuarial Contingencies)

Business Administration and Economics (four required courses)

- ACCT 210 (Introduction to Financial Accounting)
- ECON 252 (Principles of Microeconomics)
- FINC 321 (Financial Management)
- FINC 325 (Investments)

Allied requirements (two required courses)

- CISC 130 (Introduction to Programming and Problem Solving in Sciences)
- One of: ENGL 200 or above; COJO 100 (Public Speaking); COJO 105 (Communication in the Workplace)

Suggested electives:

- ECON 251 (Principles of Macroeconomics); ECON 311 (Forecasting)  
ECON 351 (Macroeconomic Theory); ECON 352 (Microeconomic Theory)  
ECON 355 (Introduction to Game Theory); BLAW 301 (The Legal

Environment of Business); FINC 324 (Advanced Financial Management) FINC 400's Investment courses; FINC 752 (Global Insurance and Risk Financing); MKTG 300 (Principles of Marketing); CISC 450 (Database Design); HIST 384 (Uses of History: Decision-Making)

### **Minor requirements**

- MATH 113 (Calculus I) [OR 108 (Calculus with Review I) AND 109 (Calculus with Review II)]
- MATH 114 (Calculus II)
- ACSC 320 (Risk Management and Insurance)
- ACSC 264 (Theory of Interest) OR FINC 325 (Investments)

Plus: two or more courses selected from the following list, at least one of which does not satisfy one's major field requirement (including allied requirements):

- MATH 200 (Multi-Variable Calculus)
- ACCT 210 (Introduction to Financial Accounting)
- ACSC 351 (Foundation of Actuarial Mathematics)
- ACSC 464 (Mathematical Finance)
- ECON 252 (Principles of Microeconomics)
- FINC 321 (Financial Management) OR FINC 300 (Finance for Non-Business Majors)
- MATH 313 (Probability) OR MATH 303 (Statistics for the Applied Sciences)

### **Special Registration Notes**

MATH 313, Probability, should be taken no later than the spring semester of your sophomore year to avoid difficulties with scheduling.

FINC 321, Financial Management prerequisites:

Actuarial science majors need to take ACCT 210, MATH 314 and ECON 252 prior to registering for FINC 321. You must obtain permission to register for this course from the Opus College of Business Undergraduate Administration office [Georgia Fisher, (651) 962-5547, [gfisher@stthomas.edu](mailto:gfisher@stthomas.edu)].

Courses offered only once a year

Fall semester: ACSC 320, MATH 314, ACSC 351, ACSC 464

Spring semester: MATH 313, ACSC 264, ACSC 352, MATH 333

## **Actuarial exams**

By passing a series of examinations, an actuary attains professional standing and admission to the Society of Actuaries (SOA) or the Casualty Actuarial Society (CAS). This difficult sequence of exams is comparable to obtaining an advanced degree. The early exams are often taken before graduation and emphasize mathematical topics generally covered in undergraduate courses. The later exams are typically taken after one has begun work in the field and cover topics such as risk management, investments, retirement benefits and general insurance. The advanced exams differ for the two societies.

The current UST program prepares students for the first three exams. An independent study course introducing the topics of the fourth exam may be arranged with a faculty supervisor.

Most exams are offered twice a year and require registration well in advance. The first exam, Exam 1/P, is offered four times per year. Details concerning the schedule and character of the exams are available from the societies, whose Web sites are given on the next page.

## **Validation by Educational Experience (VEE)**

In addition to passing actuarial exams, students interested in becoming a Fellow of the SOA or CAS must achieve Validation by Educational Experience by taking courses in economics, corporate finance and statistics. The following UST courses are approved by the professional societies, SOA and CAS, to fulfill these VEE requirements. To qualify, you must earn a grade of B- or higher in **each** course.

Economics:

ECON 251, Principles of Macroeconomics **and**  
ECON 252, Principles of Microeconomics

Corporate Finance:

FINC 324, Corporate Finance **or**  
the combination of FINC 321, Financial Management and  
ACSC 464, Mathematical Finance

Applied Statistics:

MATH 333, Applied Statistical Methods: Regression, Time Series,  
Forecasting

## **Where do I go for more information?**

Information on actuarial careers and the sequence of actuarial exams is available from

- The Society of Actuaries  
[www.soa.org](http://www.soa.org)
- The Casualty Actuarial Society  
[www.casact.org](http://www.casact.org)
- Be An Actuary: A Career Without Boundaries  
[www.beanactuary.org/](http://www.beanactuary.org/) (Web site sponsored by SOA and CAS)

## **Scholarship and research opportunities**

The actuarial science program annually awards a number of scholarships funded by regional, national and international insurance and consulting companies. The program also offers an exam fee reimbursement program for students who successfully pass actuarial exam(s).

Through the Center for Applied Mathematics in the Department of Mathematics, students have the opportunity to work on summer research projects related to practical insurance problems. A stipend is paid and free summer housing is available for a limited number of students. Past research projects include “Optimal Timing of Social Security Benefits”, “Pricing Models for Long-term Care Insurance” and “Post Retirement Benefits Costs.”

## **Additional opportunities**

The actuarial science program at St. Thomas offers several learning opportunities outside the classroom: internships; study abroad; department-sponsored talks by actuarial professionals; and the Math and Actuarial Science Club. Annual events include a resume/interview session held during fall semester, which offers a resume review and mock interviews (sophomores are particularly encouraged to attend); a career and internship fair at the University of Minnesota held in mid-November, attended by local companies; and Exam P study sessions led by a professor during spring semester.

## **Sample course sequence**

While there are several possible schedules that provide the necessary academic background in actuarial science, students find it useful to refer to the sample four-year schedule on the next page as they plan their progress through the major. This 32-course schedule reflects general graduation requirements as of fall 2008. Check the Web site for the most current requirements.

**Courses marked with an asterisk are offered only once a year.**

## YEAR ONE

### Fall Semester

- MATH 113: Calculus I
- ECON 252: Principles of Microeconomics
- ENGL 111: Critical Reading & Writing I: Fiction & Nonfiction Prose
- Lab Science

### Spring Semester

- MATH 114: Calculus II
- CISC 130: Intro to Programming and Problem Solving in the Sciences
- THEO 101: The Christian Theological Tradition
- ENGL 112: Critical Reading & Writing II: Drama & Poetry

## YEAR TWO

### Fall Semester

- MATH 200: Multivariable Calculus
- ACSC 320: Risk Management & Insurance\*
- Foreign Language (I)
- History Course

### Spring Semester

- MATH 240: Linear Algebra
- MATH 313: Probability\* (see “Special Registration Notes”)
- A Communication Course
- Foreign Language (II)

Take EXAM 1/P: Probability

## YEAR THREE

### Fall Semester

- MATH 314: Mathematical Statistics\*
- ACCT 210: Introduction to Financial Accounting
- PHIL 115: Philosophy of the Human Person
- Foreign Language (III)

### Spring Semester

- ACSC 264: Theory of Interest\*
- FINC 321: Financial Management (see “Special Registration Notes”)
- THEO 200-level Course
- MATH 333: Applied Statistical Methods: Regression, Time Series and Forecasting\*

Take EXAM 2/FM: Financial Mathematics

## YEAR FOUR

### Fall Semester

- ACSC 351: Foundations of Actuarial Mathematics\*
- ACSC 464: Mathematical Finance\*
- FINC 325: Investments
- THEO 300-level Course

Take EXAM 3F/MFE: Financial Economics

### Spring Semester

- ACSC 352: Actuarial Contingencies\*
- PHIL 214: Introductory Ethics
- A Human Diversity Course
- A Fine Arts Course

Take EXAM 3L/MLC: Life Contingencies (& Statistics for CAS)

## About St. Thomas

The University of St. Thomas is a Catholic, comprehensive university that fosters a tradition of service to the public and an energetic, thoughtful approach to the challenges of contemporary life. Serving 11,000 undergraduate and graduate students, St. Thomas is located in Minnesota's Twin Cities of St. Paul and Minneapolis.

### Contact Information

Visit our Web site at  
[www.stthomas.edu/mathematics](http://www.stthomas.edu/mathematics)

Or contact

Dr. Heekyung Youn, Program Director  
211 O'Shaughnessy Science Hall  
(651) 962-5538  
[hkyoun@stthomas.edu](mailto:hkyoun@stthomas.edu)

Ruthie Knoche Granheim, Administrator  
201 O'Shaughnessy Science Hall – Department Office  
(651) 962-5520  
[rkgranheim@stthomas.edu](mailto:rkgranheim@stthomas.edu)



UNIVERSITY of ST. THOMAS

MINNESOTA

College of Arts and Sciences

The University of St. Thomas does not discriminate on the basis of race, color, creed, religion, ancestry, national origin, sex, sexual orientation, disability, age, marital status, or status with regard to public assistance in the employment of faculty or staff, the admission or treatment of students, or in the operation of its educational programs and activities.