ACTUARIAL SCIENCE

UNDERGRADUATE DEGREE PROGRAM

LEONARD N. STERN SCHOOL OF BUSINESS

NEW YORK UNIVERSITY

02/01/2024

1. THE ACTUARIAL SCIENCE PROFESSION

Have you ever wondered how insurance companies and other organizations measure the risk associated with insuring individuals and companies against the losses incurred as a result of unpredictable events, such as accidents, sickness, and lawsuits? Or how insurance companies manage their risk so as to have sufficient assets on reserve to pay out claims resulting from such disasters as hurricanes and floods?

Professionals known as actuaries handle these kinds of problems. Because of the nature of the insurance business, an actuary has to be trained in the disciplines of mathematics, probability, statistics, economics, and finance as applied to the problems of evaluating and measuring risk. Actuaries have been called the architects of the insurance industry because they design the structure of a variety of benefits for society. Examples of problems that actuaries deal with are the determination of premiums for life, health, automobile, and homeowner policies, the design of pension plans, and the management of insurance assets to control the risk of the insurance company.

Actuarial work is one of the most interesting and exciting professions, because of the variety of functions actuaries are asked to perform. An actuary serves as a statistician and mathematician in performing the mathematics involved in designing insurance and pension funds. He or she serves as an investment analyst in managing the assets of an insurance company or pension fund. He or she serves in a marketing role in the promotion of different kinds of insurance benefits. It is a wonderful profession for an individual who enjoys mathematics and the problems associated with applying mathematical methods to problems that exist in society. In a recent survey which included over 500 professions within the United States, the actuarial profession was determined to be one of the most desirable. This conclusion was based on a number of characteristics that include compensation, working conditions, work variety, challenging problems, job security, mobility, and quality of life.

Actuaries have a large number of employment choices both with respect to the kind of career to choose and the area of the country to live. Actuaries are employed by a large variety of organizations, such as insurance companies, actuarial consulting firms, and government agencies like the Social Security Administration. The big centers of insurance activity in the United States are New York City, Hartford, Boston, and San Francisco, but actuaries can choose to work anywhere within the USA, Canada, or in any part of the world. The demand for actuaries in the United States continues to expand and the supply of trained professionals is very low.

2. PROFESSIONAL CERTIFICATION

A person becomes certified as an actuary by passing a series of examinations offered by one of two American Actuarial Societies, namely the Society of Actuaries or the Casualty Actuarial Society. The Society of Actuaries includes life actuaries who are involved with the risks associated with people, and deal with such products as life insurance, health insurance, disability insurance, and pension benefits. The Casualty Actuarial Society includes casualty actuaries, who are involved with the risks associated with property and casualty, and deal with such benefits as liability insurance, automobile insurance, and household insurance.

The Society of Actuaries and the Casualty Actuarial Society have made substantial revisions in their examination structure which became effective in the year 2015 and then again in 2018. These changes have resulted in an emphasis on academic accreditation in economics, finance, and mathematical statistics in addition to the probability and financial mathematics topics in the first two examinations.

The Society of Actuaries and the Casualty Actuarial Society examinations differ in emphasis. However, the first, the second, and the third examinations are identical for the two societies. From then on the emphasis is different to reflect the applications of risk management in the two societies. As a result, the prospective actuary does not have to make a decision as to which society to choose until he or she begins working in the profession.

3. CAREER PREPARATION AT STERN

Students can prepare for an Actuarial Career by enrolling within Stern Undergraduate College and choosing the actuarial science concentration. The curriculum of the Bachelor's program offers students both the mathematical and the functional business components, which are necessary for the training of an actuary. Students begin by taking a series of four mathematics courses and two economics courses within the College of Arts and Sciences at New York University. The actuarial science student with a concentration in actuarial science then takes courses in probability, statistics, financial mathematics and actuarial mathematics within the Department of Statistics and Actuarial Science at the Stern School of Business. The other courses in finance, marketing, accounting, management, and information technology are also taken at the Stern School of Business.

The program at Stern prepares students to take the first four examinations offered by the Society of Actuaries and the Casualty Actuarial Society. The courses at Stern also satisfy the three VEE (Validation by Educational Experience) areas of Economics, Finance, and Mathematical Statistics.

A description of the requirements for the actuarial science concentration at Stern appears in section 4. The content of the first four actuarial examinations, along with the corresponding NYU courses, which cover the corresponding material, appears in section 5.

4. ACTUARIAL SCIENCE CONCENTRATION COURSE OF STUDY

A. Courses in Mathematics (16 credits required)

MATH-UA 121	Calculus I
MATH-UA 122	Calculus II
MATH-UA 123	Calculus III
MATH-UA 140	Linear Algebra

B. Courses in Economics (8 credits required)

ECON-UB 1/2	Microeconomics with Algebra/Calculus
ECON-UB 11	Economics of Global Business

C. Courses in Probability, Statistics, and Financial Mathematics (12 credits required)

STAT-UB 14	Introduction to the Theory of Probability
STAT-GB 6018	Mathematics of Investment

and two of the following 5 courses:

STAT-GB 6008	Applied Stochastic Processes for Financial Models
STAT-GB 6015	Statistical Inference and Regression Analysis
STAT-GB 6018	The Forecasting of Time Series Data
STAT-GB 6021	Introduction to Stochastic Processes

Students can choose to take more than a total of 4 courses in preparation for an Actuarial career.

D. Courses in Finance (7 credits required)

FINC-UB 2	Foundations of Finance
FINC-UB 7	Corporate Finance

E. Other Stern Requirements (62 credits)

The liberal arts courses and Stern business courses are required for all students at the Stern School of Business. These courses include Writing Classes, one Natural Science, a series of Humanities courses, Accounting, Marketing, Management, Operations, Global requirements and Computing & Data Science courses.

F. Recommended Electives (23 credits)

For students choosing a concentration in actuarial science, the following list of possible three credit courses would be useful. Students who elect to take three additional finance courses would also satisfy the requirements to have a concentration in finance. Many students choose finance as a second concentration since finance is an integral activity of professional actuaries.

FINC-UB 22	Risk Management in Financial Institutions
FINC-UB 41	Equity Valuation
FINC-UB 26	Debt Instruments and Markets
FINC-UB 43	Futures & Options
STAT-GB 6008	Applied Stochastic Processes for Financial Models[1]
STAT-GB 6015	Statistical Inference and Regression Analysis[1]
STAT-GB 6018	Forecasting of Time Series Data[1]
STAT-GB 6021	Introduction to Stochastic Processes[1]

NOTE: A selection of additional actuarial science courses may put the student over the Stern maximum of 18 credits for elective courses. If that occurs, consult the Director of the Actuarial Science Program to request a waiver of this requirement.

[1] If not already selected

ACTUARIAL SCIENCE COURSE SCHEDULES

The following table lists the schedule of Actuarial Science courses. This schedule is subject to change. Students should consult both this schedule and the Director of the Actuarial Science Program in planning for their courses.

COURSE TITLE	FALL 2024	SPRING 2025	FALL 2025	SPRING 2026	FALL 2026	SPRING 2027	FALL 2027	SPRING 2028
Introduction to the Theory of Probability	YES	NO	YES	NO	YES	NO	YES	NO
Mathematics of Investment	NO	YES	NO	YES	NO	YES	NO	YES
Applied Stochastic Processes for Financial Models	NO	YES	NO	YES	NO	YES	NO	YES
Statistical Inference and Regression Analysis	NO	NO	NO	YES	NO	NO	NO	YES
The Forecasting of Time Series Data	NO	YES	NO	YES	NO	YES	NO	YES
Introduction to Stochastic Processes	NO	YES	NO	NO	NO	YES	NO	NO

NOTES:

1. Students generally take Introduction to the Theory of Probability in the fall of their sophomore year.

2. If you wish to study abroad, it is recommended that you select the spring semester of your sophomore year, in order to avoid missing the Introduction to the Theory of Probability course in the fall semester of your sophomore year.

3. For other questions regarding sequencing of courses, please consult the Director of the Actuarial Science Program or your advisor.

5. ACTUARIAL EXAMINATIONS

A. VALIDATION BY EDUCATIONAL EXPERIENCE (VEE EXAMINATIONS: EFFECTIVE JULY 2018)

1. Economics

Topics in microeconomics and macroeconomics. Students will be waived from this requirement by obtaining a grade of B- or better in ECON-UB 1/2 (Microeconomics) and ECON-UB 11 (Economics of Global Business).

2. Accounting and Finance

Topics in accounting, corporate finance and investment principles. Students will be waived from this requirement by obtaining a grade of B- or better in ACCT-UB 1 (Principles of Financial Accounting), FINC-UB 2 (Foundations of Finance), and FINC-UB 7 (Corporate Finance).

3. Mathematical Statistics

Topics in probability and mathematical statistics. Students will be waived from this requirement by obtaining a grade of B- or better in STAT-UB 14 (Introduction to the Theory of Probability) and STAT-GB 6015 (Statistical Inference and Regression Analysis).

NOTES:

1. The Economics and Finance examinations are required for both the Society of Actuaries and the Casualty Actuarial Society.

2. The Mathematical Statistics examination is not required for the Casualty Actuarial Society, but is required for the Society of Actuaries.

B. REQUIRED EXAMINATIONS (Society of Actuaries)

P. Probability

This course covers probability with applications to risk management. The NYU Stern course, which covers probability, is STAT-UB 14. A short study note on risk and insurance is provided by the actuarial societies.

FM. Financial Mathematics

The topics are covered in the NYU Stern course STAT-GB 6027 (Math of Investment).

C. REQUIRED EXAMINATIONS (Casualty Actuarial Society)

P. Probability

This is a requirement which can be satisfied by taking the Society of Actuaries examination P. The NYU Stern course, which covers probability, is STAT-UB 14. A short study note on risk and insurance is provided by the Society of Actuaries.

FM. Financial Mathematics

This is a requirement which can be satisfied by taking the Society of Actuaries examination FM. The topics are covered in the NYU Stern course STAT-GB 6027.

MAS-1. Modern Actuarial Statistics I

A number of topics cover statistics, regression and times series models, and probabilistic models. (NYU Stern courses STAT-GB 6015, STAT-GB 6018, and STAT-GB 6021, covers virtually all of this material.

6. ACTUARIAL SOCIETY OF NYU STERN

The Stern School of Business has an active Actuarial Society which is student run. This society runs frequent seminars and meetings where representatives from different firms, professors, and alumni who work as professional actuaries come to speak on various topics within the actuarial profession. These topics have included pension consulting, health insurance, property and casualty insurance, examination curriculum and actuarial research. Information about the activities of the Actuarial Society can be obtained by emailing the society at actrlsoc@stern.nyu.edu .

7. RECRUITING AND INTERNSHIPS

New York City, Boston, and Hartford are three major centers of insurance activity within the United States. New York University is located strategically in the center of New York City. Boston and Hartford are within 250 miles of New York City. Consequently, there is a great deal of opportunity for students to obtain paid summer employment within a consulting firm or an insurance company, which is a valuable experience. Furthermore, many insurance companies recruit on campus and the local Actuarial Society of New York sponsors an annual career fair in the Fall.

8. FURTHER INFORMATION

To obtain further information, please write or email:

Professor Aaron Tenenbein (at1@stern.nyu.edu), Director of the Actuarial Science Program,

Address:

Leonard N. Stern School of Business Administration
New York University
Kaufman Management Center
44 West Fourth Street, Suite 8-53
New York, New York 10012
Phone (212) 998-0474

For further information on New York University, please consult the website www.nyu.edu.

For further information on the Actuarial profession, contact either the Casualty Actuarial Society or the Society of Actuaries. The corresponding addresses and web sites appear below:

Casualty Actuarial Society
1100 N Glebe Road,
Suite 600
Arlington, VA 22201
(703) 276-3100
www.casact.org

Society of Actuaries
475 North Martingale Road,
Suite 800
Schaumburg, IL 60173
(847) 706-3500
www.soa.org

Another useful website to consult is www.beanactuary.com