ACTUARIAL SCIENCE

UNDERGRADUATE DEGREE PROGRAM

LEONARD N. STERN SCHOOL OF BUSINESS
NEW YORK UNIVERSITY

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. These changes have resulted in an emphasis on academic accreditation in economics, finance, and 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. There are differences in the fourth examination. 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 Applied Statistical Methods.

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   Microeconomics
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-UB 27   Mathematics of Investment

and two of the following 4 courses:

STAT-UB 15   Statistical Inference and Regression Analysis[1]
STAT-UB 18   The Forecasting of Time Series Data
STAT-UB 21   Introduction to Stochastic Processes
STAT-UB 37   Life Contingencies

It is recommended that students take all of the above 6 courses for preparation of the actuarial examinations.

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1. This course can be substituted by taking STAT-UB 17: Regression and Multivariate Data Analysis. However, it is strongly recommended that students take STAT-UB 15. The topics in STAT-UB 15 are essential for the later actuarial examinations (see pages 9 and 10 of this handbook and consult the actuarial websites listed on page 12 of this handbook).

D.   Courses in Finance (7 credits required)

FIN-UB 2   Foundations of Finance
FIN-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 Workshops, one Natural Science, a series of Humanities courses, Accounting, Marketing, Management, International Studies, Operations, and Information Systems 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 an additional concentration since finance is an integral activity of professional actuaries. In particular, the course C15.0043, Futures and Options, is highly recommended, since it covers approximately 75% of the MFE/3F actuarial examination (see pages 9 and 10).

FIN-UB 22   Risk Management in Financial Institutions
FIN-UB 41   Equity Evaluation
FIN-UB 43   Futures and Options
STAT-UB 15   Statistical Inference and Regression Analysis[2]
STAT-UB 18   The Forecasting of Time Series Data[2]
STAT-UB 21   Introduction to Stochastic Processes[2]
STAT-UB 37   Life Contingencies[2]

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.

2. 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 2015	SPRING 2016	FALL 2016	SPRING 2017	FALL 2017	SPRING 2018	FALL 2018	SPRING 2019
Introduction to the Theory of Probability	YES	NO	YES	NO	YES	NO	YES	NO
Mathematics of Investment	YES	NO	YES	NO	YES	NO	YES	NO
Statistical Inference and Regression Analysis	NO	YES	NO	NO	NO	YES	NO	NO
Regression and Multivariate Data Analysis	YES	YES	YES	YES	YES	YES	YES	YES
The Forecasting of Time Series Data	YES	YES	YES	YES	YES	YES	YES	YES
Life Contingencies	NO	NO	NO	YES	NO	NO	NO	YES
Introduction to Stochastic Processes	YES	NO	YES	NO	YES	NO	YES	NO

NOTES:

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

2. It is strongly recommended that students take Foundations of Finance before Mathematics of Investments.

3. If you wish to study abroad, it is recommended that you select the spring semester of your sophomore year, in order to avoid missing major actuarial science courses at Stern.

4. 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)

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 and ECON-UB 11.

2. Finance

Topics in corporate finance and investment principles. Students will be waived from this requirement by obtaining a grade of B- or better in FIN-UB 2 AND FIN-UB 7.

3. Applied Statistical Methods

Topics in regression analysis and time series analysis. Students will be waived from this requirement by obtaining a grade of B- or better in STAT-UB 15 or STAT-UB 17 AND STAT-UB 18.

NOTES:

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

2. The Applied Statistical Methods examination is not required for the Casualty Actuarial Society, but is required for the Society of Actuaries.

5. ACTUARIAL EXAMINATIONS

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 courses STAT-UB 27 and FIN-UB 2.

MFE. Actuarial Models of Financial Economics

A number of topics covering derivative securities, futures, and options. The NYU Stern course FIN-UB 43 covers approximately 75% of the material.

MLC. Actuarial Models of Life Contingencies

A number of topics cover probabilistic models, which are important in actuarial science. The NYU Stern course STAT-UB 37 covers approximately 75% of this material.

NOTE Actuarial examinations P, FM, and MFE administered by the Society of Actuaries are identical to the corresponding actuarial examinations 1, 2, and 3F administered by the Casualty Actuarial Society.

5.   ACTUARIAL EXAMINATIONS

B.   REQUIRED EXAMINATIONS (Casualty Actuarial Society)

1.   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.

2.   Financial Mathematics

The topics are covered in the NYU Stern courses STAT-UB 27 and FIN-UB 2.

3F.   Actuarial Models: Financial Economics

A number of topics covering derivative securities, futures, and options. The NYU Stern course FIN-UB 43 covers approximately 75% of the material.

S.   Statistics and Probabilistic Models

A number of topics cover statistics, regression and times series models, probabilistic models, and life contingencies. (NYU Stern courses STAT-UB 15, STAT-UB 18, STAT-UB 21, and STAT-UB 37 covers virtually all of this material.

NOTE   Actuarial examinations 1, 2, and 3F administered by the Casualty Actuarial Society are identical to the corresponding actuarial examinations P, FM, and MFE administered by the Society of Actuaries.

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 November.

8. FURTHER INFORMATION

To obtain further information, please write or email:

Professor Aaron Tenenbein (atenenbe@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	Society of Actuaries
1100 N. Glebe Road,	475 North Martingale Road,
Suite 600	Suite 800
Arlington, VA 22201	Schaumburg, IL 60173
(703) 276-3100	(847) 706-3500
www.casact.org	www.soa.org

Another useful website to consult is www.beanactuary.com