

**What is an actuary? How does one become
an actuary? Getting Ready for the First
Examination**

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Computer and Mathematics Related Occupations

- Accountants and Auditors
- *Actuaries*
- Computer Programmers
- Computer Scientists, Computer Engineers, and System Analysts
- Economists and Marketing Research Analysts
- Engineering, Science, and Computer System Managers
- Mathematicians
- Operations Research Analysts
- Statisticians

Source:

www.pueblo.gsa.gov/cic_text/employ/compmath/oohmath.htm

Actuarial Science

Actuarial Science is concerned with the random events that affect human life or property and the financial impact that the occurrence of one of those events may have.

In the case of human life, those events include birth, death, marriage, sickness, accident, disability, and retirement.

In the case of property, events such as fire, windstorm, accident, flood, theft, and fraud may be involved.

Actuary

The actuary is trained to analyze the risk of occurrence of those events, to estimate their probabilities of occurrence, and to construct financial security programs that alleviate their financial impact.

The actuary combines the probabilities of occurrence of those events with the rates of return on investment to determine premiums, reserves, and other financial quantities required in the management and regulation of insurance and pension systems.

Required Knowledge for an Actuary

An actuary must have sound knowledge of mathematics, especially mathematical probability and statistics, and should be familiar with economics, computer science, and the business environment generally.

In particular, the actuary must have a theoretical and practical knowledge of the insurance business.

In addition to a strong foundation in mathematics, an actuary will ideally possess the decision making and persuasive skills required of executives and managers, especially the ability to communicate with others, to understand and work with them.

Salary

Starting salaries for actuaries are very attractive an increase substantially as experience is gained and responsibility assumed.

Many actuaries reach high level executive positions and command very high salaries.

Source: <http://www.wisc.edu/insure/degrees.htm>

Actuarial Designations

- Property/Casualty
FCAS: Fellow of the Casualty Actuarial Society
ACAS: Associate of the Casualty Actuarial Society
- Life
FSA: Fellow of the Society of Actuaries
ASA: Associate of the Society of Actuaries
- Other Designations
EA: Enrolled Actuary
MAAA: Member, American Academy of Actuaries

Actuaries

Nature of Work

- Answer questions about future risk
- Make pricing decisions
- Formulate investment strategies

Work

- Insurance Industry
- Consultants
- Government
- Pension Plans
- Brokers
- Financial Services Industry
- Academic

Qualifications for a Beginning Job

- Bachelor's degree in mathematics, actuarial science, statistics, economics, finance or accounting
- Knowledge in computer applications
- Good communication skills and interpersonal skills

Source:

www.pueblo.gsa.gov/cic_text/employ/compnmath/ocos041.htm

More Information:

www.BeAnActuary.org

Salary surveys:

<http://www.dwsimpson.com/salary.html>

UK and some of the former British colonies: Faculty
and Institute of Actuaries

<http://www.actuaries.org.uk/index2.html>

Basic Exams

- Course 1: Mathematical Foundations of Actuarial Science (Calculus and Probability)
- Course 2: Interest Theory, Economics and Finance
- Course 3: Actuarial Models
(Life contingencies, loss distributions, stochastic processes, risk theory, simulation)
- Course 4: Actuarial Modeling
(Econometrics, credibility theory, model estimation)

Advanced Exams

- Course 5: Application of Basic Actuarial Principles
- Course 6: Finance and Investments
- Associate Professionalism Course

ASA: Associate of the Society of Actuaries.

Requirements for Fellowship

- Course 7: Applied Modeling
 - Pre-Seminar Test
 - Seminar

- Course 8: Selected field among the following:
 - Finance
 - Health, Grouped Life and Managed Care
 - Individual Insurance
 - Investments

Fellowship

Details about Exam 1

Type: Multiple choice
Time: Three hours
When: May and November
Venue: Here at PSU

Classes at PSU:

- Calculus I, II , and III
- Probability and Statistics
- Mathematical Statistics

Sample Exam: May 2000

<http://www.soa.org/eande/mathrev.pdf>

Calculus

Set Theory

Intervals, Inequalities, Absolute Value, and Upper and Lower Bounds

Analytic Geometry in 2-D and 3-D

Functions

Limits and Continuity

Differentiation

Curve Sketching

Integration

Techniques of Integration

Multiple Integration

Sequences and Series

Probability

Sample Spaces and Events

Probability

Conditional Probability and Independence of Events

Permutations and Combinations

Random Variables and Probability Distributions

Expectation, Mean, and Variance

Discrete Distributions

Continuous Distributions

Joint, Marginal, and Conditional Distributions

Functions and Transformations of Random Variables

Risk Management

Loss Distributions and Insurance

Source: Actex Study Manual Course 1, 2000 edition

Our Plan for the Spring of 2000

- Regular meetings of the Society to cover topics in Calculus, Probability, and Probability for Risk Management. Faculty and students will take turns to lead the sessions.
- Some additional topics will be covered in Mathematical Statistics (Math 643) class

Our students should try to pass the first two exams while they are in school.

Related Areas of Research for a Mathematician*

- Financial mathematics
- Stochastic calculus
- Fuzzy set theory
- Markov chain Monte Carlo
- Neural networks
- Chaos theory/ fractals

Some Recent Research Papers

Patricia Cerrito, Dennis Olson and Krzysztof Ostaszewski, "Nonparametric tests for the random walk in stock prices", *Advances in Quantitative Analysis of Finance and Accounting*, vol. 6, pp. 27-36, 1998.

Lin, X. and G.E. Willmot (1999) “ The moments of the time of ruin, the surplus before ruin, and the deficit at ruin,” submitted to *Insurance: Mathematics and Economics*.

Virginia R. Young (1993), “The application of fuzzy sets to group health underwriting, with discussion”, *Transactions of the Society of Actuaries*, 45: 551-590.

Krzysztof Ostaszewski (1993), “An Investigation into Possible Applications of Fuzzy Sets Methods in Actuarial Science”, *Society of Actuaries*, Schaumburg, Illinois.