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

by
Dr. Ananda Jayawardhana
Assistant Professor of Mathematics
Department of Mathematics
PSU

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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/compnmath/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.
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 and 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/compmnmath/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.
My Tentative Plan for the Next Year

- Spring 2001  Applied Non-parametric Statistics  
  (Already committed)

- Summer 2001  Survival Analysis  (Already committed)

- Fall 2001  Interest Theory  (I plan to develop this course during summer 2001)
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


