

COURSE NAME: **Mathematics 570** **Mathematical Foundation of Actuarial Science**

PREREQUISITE: MATH 561.

COURSE DESCRIPTION:

This is a preparatory course for **Society of Actuaries Exam P** or **CAS Exam 1**

This 3 hour multiple-choice examination is administered by SOA/CAS and is identical to CAS Exam 1. Exam P is now being offered as a computer-based test. Details on this appear in the *Exam P Computer-Based Testing Administration Details* section under General Information and at http://www.beanactuary.org/exams/prob_exam.cfm. Check the [Updates](#) section of the SOA Web Site for any changes to the exam or *Syllabus*.

The purpose of this course of reading is to develop knowledge of the fundamental probability tools for quantitatively assessing risk. The application of these tools to problems encountered in actuarial science is emphasized. A thorough command of probability topics and the supporting calculus is assumed. Additionally, a very basic knowledge of insurance and risk management is assumed.

LEARNING OUTCOMES

Candidates should be able to use and apply the following concepts in a risk management context:

1. General Probability
 - Set functions including set notation and basic elements of probability
 - Mutually exclusive events
 - Addition and multiplication rules
 - Independence of events
 - Combinatorial probability
 - Conditional probability
 - Bayes Theorem / Law of total probability
2. Univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, chi-square, beta, Pareto, lognormal, gamma, Weibull, and normal)
 - Probability functions and probability density functions
 - Cumulative distribution functions
 - Mode, median, percentiles, and moments
 - Variance and measures of dispersion
 - Moment generating functions
 - Transformations
3. Multivariate probability distributions (including the bivariate normal)
 - Joint probability functions and joint probability density functions
 - Joint cumulative distribution functions
 - Central Limit Theorem
 - Conditional and marginal probability distributions
 - Moments for joint, conditional, and marginal probability distributions
 - Joint moment generating functions
 - Variance and measures of dispersion for conditional and marginal probability distributions
 - Covariance and correlation coefficients
 - Transformations and order statistics
 - Probabilities and moments for linear combinations of independent random variables