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SYLLABUS OF BASIC EDUCATION
2021
Probability – Exam 1

The syllabus for this basic education requirement is defined in the form of learning objectives that set forth, usually in broad terms, what the candidate should be able to do in actual practice.

Please check the “*Syllabus Updates*” section of the CAS Web Site for any changes to the *Syllabus*. The options for obtaining credit for this basic education requirement are listed below and in Examination Rules, C. Grades and Accreditation, [Waivers of Examinations](#) section of the *Syllabus*.

The purpose of the syllabus 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 the supporting calculus is assumed. Additionally, a very basic knowledge of insurance and risk management is assumed.

A. General Probability

LEARNING OBJECTIVES
<p>1. Use and apply the following concepts in a risk management context:</p> <ul style="list-style-type: none">• 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



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B. Univariate Probability Distributions

This section includes binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, gamma, and normal distributions.

LEARNING OBJECTIVES

1. Use and apply the following concepts in a risk management context:
 - Probability functions and probability density functions
 - Cumulative distribution functions
 - Mode, median, percentiles, and moments
 - Variance and measures of dispersion
 - Moment generating functions
 - Transformations

C. Multivariate Probability Distributions

This section includes the bivariate normal distribution.

LEARNING OBJECTIVES

1. Use and apply the following concepts in a risk management context:
 - 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



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Options for Obtaining Exam 1 Credit

The CAS will grant credit for Exam 1 to those who have successfully completed one of the following examinations:

Organization	Examination
Actuarial Society of South Africa	A111, Actuarial Statistics
Actuaries Institute (Australia)	CS1, Actuarial Statistics 1
Canadian Institute of Actuaries (CIA)	University Accreditation Program credit for Probability ¹
China Association of Actuaries	CAA, A1 Probability
Institute of Actuaries of India	CS1, Actuarial Statistics 1
Institute and Faculty of Actuaries (U.K.)	CS1, Actuarial Statistics 1
Society of Actuaries	P, Probability

1. For credit granted through the CIA's University Accreditation Program, the list of candidates granted waivers by the CIA is provided to the CAS following the end of a semester. The CAS automatically updates its records. No further action is required of candidates.

To obtain credit, candidates should follow the procedures outlined on the [Waivers of Examination](#) page of the CAS website.