

## Probability and Statistics

**Course Name:** Probability and statistics

**Course Code:** GEN105

**Credit Hours:** 3

**Knowledge Domain:** General Fundamentals.

**Prerequisite(s):** Mathematics (1) (GEN103).

### Learning Objectives

Upon completion of this course, the student will be able to:

1. Understand the basic concepts of probability and random variables.
2. Demonstrate examples of probability distribution.
3. Apply simple exposition of stochastic processes.
4. Get the basic ideas of statistical inference and hypothesis testing.

### Learning Outcomes

1. Grasp the basic aspects of probability with some basic probability distribution.
2. Acquire the basic statistical techniques through statistical inferencing.

### Overview and Syllabus

Probability and random variables. Probability distributions. Examples of stochastic processes. Statistical inference. Hypothesis testing.

### Course Outline

	<b>Topic</b>
1	<b><u>Introduction to Probability</u></b> Topic 1.1: Introduction Topic 1.2: Sets and its Operations Topic 1.3: The Counting Principles Topic 1.4: Random Experiment Topic 1.5: Sample Space and Events Topic 1.6: Discrete Uniform Probability Law Topic 1.7: Continuous Probability Model Topic 1.8: Conditional Probability Topic 1.9: Total Probability Theorem and Baye's Rule

	Topic 1.10: Independence
2	<b><u>Discrete Random Variable</u></b> Topic 2.1: The Random Variable Topic 2.2: Discrete Random Variable Topic 2.3: Some Special Discrete Distributions Topic 2.4: Moment Generating Function
3	<b><u>Continuous Random Variable</u></b> Topic 3.1: Continuous Random Variable Topic 3.2: Some Special continuous Distributions Topic 3.3: Moment Generating Function
4	<b><u>Multiple Random Variables</u></b> Topic 4.1: Joint Distribution Function Topic 4.2: Covariance and Correlation Coefficient Topic 4.3: Independent Random Variables Topic 4.4: Limit Theorems Topic 4.5: Stochastic Processes
5	<b><u>Sampling Distribution and Estimation Theory</u></b> Topic 5.1: Data Summary and Display Topic 5.2: Sampling Theory Topic 5.3: Sampling Distribution Topic 5.4: Estimation Theory Topic 5.5: Methods of Point Estimation Topic 5.6: Confidence Interval
6	<b><u>Test of Hypotheses</u></b> Topic 6.1: Testing Hypotheses Topic 6.2: One Sided and Two Sided Hypotheses Topic 6.3: Test on the Mean (Variance Known) Topic 6.4: Test on the Mean (Variance Unknown) Topic 6.5: Test on Variance Topic 6.6: Test on Difference in Means (Variance Known) Topic 6.7: Test on Difference in Means (Variance Unknown) Topic 6.8: Chi-Squared Test of Goodness of Fit