

Introduction to Statistics and Probability

Course Description

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	This course provides an introduction to the fundamental concepts of probability and statistics, designed for students with no prior background in the subject. The course covers key topics in probability theory, data analysis, and statistical inference. Students will learn how to apply statistical methods to real-world problems, interpret data, and understand the principles that underpin decision-making in uncertain situations.
Course Objectives	
	<ol style="list-style-type: none">1. Distinguishing and understanding of basic concepts of statistics.2. Use graphical and numerical methods to describe and interpret the distribution of a single variable and the relationship between two variables, including measures of central tendency and variability.3. Comprehend the basic principles of probability, including random variables, probability distributions, and conditional probability, and apply them to real-world scenarios.

Course Learning Outcomes

Outcomes	
Knowledge	
K1	Distinguishing and understanding of basic concepts of statistics.
K2	Describing data with graphs and numerical measures.
K3	Understanding fundamental concepts of probability, including sample spaces, events, and conditional probability.
Skills	
S1	Students will use various techniques for concisely describing data.
S2	Students will create and interpret visualizations like histograms, scatterplots, and box plots to summarize and analyze data
Competence	
C1	Work effectively in teams to collect, analyze, and interpret data.
C2	Make informed decisions based on statistical evidence.

Topics

Topic (1): Describing Data with Graphs

- 1.1 Variables and Data.
- 1.2 Types of Variables.
- 1.3 Graphs of Categorical Data.
- 1.4 Graphs of Quantitative Variables.
- 1.5 Relative Frequency Histograms.

Topic (2): Describing Data with Numerical Measures

- 2.1 Describing a Set of Data with Numerical Measures.
- 2.2 Measures of Center.
- 2.3 Measures of Variability.
- 2.4 On the Practical Significance of the Standard Deviation.
- 2.5 A Check on the Calculation of s .
- 2.6 Measures of Relative Standing.
- 2.7 The Five-Number Summary and the Box Plot.

Topic (3): Describing Bivariate Data

- 3.1 Bivariate Data.
- 3.3 Scatterplot for Two Quantitative Variables.
- 3.4 Numerical Measures for Quantitative Bivariate Data.

Topic (4): Probability and Probability Distributions

- 4.1 The Role of Probability in Statistics.
- 4.2 Events and the Sample Space.
- 4.3 Calculating Probabilities Using Simple Events.
- 4.5 Event Relations and Probability Rules.
- 4.6 Independence, Conditional Probability, and the Multiplication Rule.
- 4.8 Discrete Random Variables, Their Probability Distributions.

Topic (5): Several Useful Discrete Distributions

- 5.2 The Binomial Probability Distribution.
- 5.3 The Poisson Probability Distribution.

Topic (6): The Normal Probability Distribution

- 6.2 Probability Distributions for Continuous Random Variables.
- 6.3 The Normal Probability Distribution.
- 6.4 Tabulated Areas of the Normal Probability Distribution.