

Probability and Statistics (CS-V Fall-2024)

General Information

Course Number	CSC-302
Credit Hours	3 (Theory Credit Hour = 3)
Prerequisite	-
Course Coordinator	

Course Objectives

This is an introductory course in probability and statistics designed to introduce students to its applications that are relevant in a variety of discipline including Computer science, and Engineering etc. The content of this course includes Descriptive Statistics, set theory review, Axioms of Probability, Addition Multiplication Laws of Probability, Independence, Conditional Probability, Law of total probability, Bayes' Rule, Random variables, some special discrete and continuous probability distributions, Expected Values, Joint distribution, Marginal distribution, Central limit theorem, sampling distributions of mean etc.

Catalog Description

CSC-302

Course Content

Week No	Topics	References/Book
1-2	Introduction to Statistics and Data Analysis <ul style="list-style-type: none"> ➤ Basic Statistical Concepts. ➤ Data Measurement: Nominal Level, Ordinal Level, Interval Level & Ratio Level. ➤ Observation and variables. ➤ Populations. ➤ Samples. ➤ Inferential statistics. ➤ Descriptive statistics. 	<p style="text-align: center;">Introductory Statistics, 9th Edition by Neil A. Weiss & Probability and Statistics for Computer Science by David Forsyth.</p>
2-3	Charts and Graphs <ul style="list-style-type: none"> ➤ Frequency Tables/Distribution ➤ Graphic Presentation of a Distribution ➤ Dispersions ➤ Class Midpoint ➤ Relative Frequency ➤ Cumulative Frequency ➤ Quantitative Data Graphs Qualitative Data Graphs ➤ Numerical Data: Scatter Plots 	
3-4	<ul style="list-style-type: none"> ➤ Descriptive Statistics <ul style="list-style-type: none"> ➤ Measures of Central Tendency ➤ Measures of central tendency for grouped and ungrouped data ➤ Means: (Arithmetic, Geometric, Harmonic) ➤ Median, Mode. ➤ Percentiles, Quartiles ➤ weighted Mean ➤ Range, Interquartile 	

	<ul style="list-style-type: none"> ➤ Range, Variance, standard deviation, Mean Absolute Deviation, ➤ Coefficient of variance 	
4-5	Probability <ul style="list-style-type: none"> ➤ Introduction to Probability ➤ Methods of Assigning Probabilities ➤ Structure of Probability ➤ Sample space ➤ Events ➤ Dependent & Independent events 	
5-6	<ul style="list-style-type: none"> ➤ Axioms of Probability ➤ Counting sample points ➤ Random experiment ➤ Marginal, Union, Joint, and Conditional ➤ Addition Laws ➤ Multiplication Laws ➤ Conditional Probability 	
7-8	Sampling and Sampling Distributions <ul style="list-style-type: none"> ➤ Sampling ➤ Sampling Distribution of \bar{x} ➤ Sampling Distribution of \hat{p} ➤ Discrete & continuous probability Distributions ➤ Central Limit Theorem 	
MID-TERM EXAM		
8-9	Random variables & probability Distribution <ul style="list-style-type: none"> ➤ Introduction ➤ Distribution function ➤ Discrete random variable and its probability distribution ➤ Continuous random variables and its probability density function ➤ Bernoulli Random Variables 	
9-10	Discrete Distributions <ul style="list-style-type: none"> ➤ Discrete Versus Continuous Distributions ➤ Describing a Discrete Distribution ➤ Binomial Distribution ➤ Poisson Distribution ➤ Hypergeometric Distribution 	
11	Continuous Distributions <ul style="list-style-type: none"> ➤ The Uniform Distribution ➤ Exponential Distribution ➤ Normal Distribution 	
13-14	Simple Regression Analysis and Correlation <ul style="list-style-type: none"> ➤ Correlation ➤ Introduction to Simple Regression Analysis. ➤ The Regression Equation. ➤ Simple Linear Regression ➤ Linear Equations with One Independent Variable. ➤ Determining the Equation of the Regression Line. ➤ The Coefficient of Determination ➤ Linear Correlation ➤ Least Square Method 	

15-16	ANALYSIS OF VARIANCE <ul style="list-style-type: none"> ➤ F-test ➤ t-test ➤ The F-Distribution ➤ One-way analysis of variance ➤ The Kruskal–Wallis Test 	
FINAL EXAM		

Text Book:

1) Ronald E. Walpole, Raymond H. Myers and Sharon L. Myers and Keying Ye, “Probability and Statistics for Engineers and Scientists”, Prentice Hall 9 th Edition.

Reference Material:

(1) Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers, 2 nd Edition. Roy D. Yates and David J. Goodman
(2) Susan Milton and Jesse C. Arnold, Introduction to Probability and Statistics: Principles and Application for Engineering and the Computing Sciences, McGraw Hill.
(3) William Mendenhall and Terry Sincich, Statistics for Engineer and Sciences, Prentice Hall

Course Learning Outcomes

	Course Learning Outcomes (CLO)
1	Understanding the fundamental concepts in Probability and Statistics
2	Analyze on data & produce mathematical probabilistic models for different problems and to interpret the results.
3	Apply the rules and algorithms of Probability and Statistics to their relevant engineering problems.

CLO-SO Map

	SO IDs											
CLO ID	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CLO 1	1	0	0	0	0	0	0	0	0	0	0	0
CLO 2	0	1	0	0	0	0	0	0	0	0	0	0
CLO 3	0	0	1	0	0	0	0	0	0	0	0	0

Approvals

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Approved By	
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