



# Capital University of Science and Technology

## Department of Computer Science

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### MTCS3063 - Probability and Statistics

**Course Title:** Probability and Statistics (MTCS3063)

**Pre-requisite(s):** Calculus and Analytical Geometry (MTCS1013)

**Credit Hours:** 3

**Instructor(s):**

**Text Book(s):** Probability and Statistics (for Engineering and Sciences) 8th Edition by J. L. Devore

**Reference Book(s):**

- Introductory Statistics by Neil A. Weiss 9<sup>th</sup> Edition
- Probability & Statistics for Engineering & Sciences (William W. Hines, Douglas C. Montgomery)
- Handouts

**Web Reference:**

- [https://wps.pearsoned.com/aw\\_weiss\\_introstats\\_9/172/44222/11321038.cw/index.html](https://wps.pearsoned.com/aw_weiss_introstats_9/172/44222/11321038.cw/index.html)
- [https://en.wikipedia.org/wiki/Probability\\_and\\_statistics](https://en.wikipedia.org/wiki/Probability_and_statistics)

### Course Introduction:

This course has been designed to enable the students to learn and apply basic tools of Probability and Statistics. It includes the understanding by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional probability with applications in Computer Science. An appropriate and adequate consideration is given to the random variables, probability distributions for discrete and continuous random variables and joint probability distributions.

### Course Objectives:

- To provide students a deeper understanding of the various descriptive and numerical methods for the description of data and associated numerical measures like mean, median, mode, variance, range, standard deviation, quartiles etc.
- To develop an understanding of the concepts and methods in probability theory.



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- To provide students, the knowledge of discrete and continuous probability distributions and their applications in problem solving.
- To enable the students to learn and apply the tools for curve fitting via Linear Regression and Correlation.

### Course Learning Outcomes (CLOs):

At the end of this course, the students should be able to:

**CLO1:** Define and illustrate the concepts and methods of Probability and Statistics. [C2 Understanding]

**CLO2:** Demonstrate an ability to use descriptive techniques to describe the statistical data. [C3 Applying]

**CLO3:** To apply the acquired knowledge of descriptive statistics and probability for the study of various random variables and associated distributions. [C3 Applying]

### CLOs – PLOs Mapping:

	<b>CLO:1</b>	<b>CLO:2</b>	<b>CLO:3</b>
PLO:3 (Problem Analysis)		√	√

### Course Contents:

<b>Week</b>	<b>Contents</b>
1	What are Statistics? Descriptive Statistics and Inferential Statistics, Characteristics of Statistics, Introduction to Some Basic Terms, Types of Classification, Bases of Classification and Application of Statistics. Statistical Data: Qualitative and Quantitative Data, Discrete and Continuous Data.



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2	Frequency, Frequency Distribution table, Graphical Representation of Data, Types of Graphs and Charts, Histogram, Cumulative Frequency Curve or Ogive, Types of Ogives and Outlier.
3	Measures of Central Tendency or Averages: Mean, Median and Mode. The Mean, Median, Mode for group and ungroup data set.
4	Quartiles, The Five Number Summary, Deciles and Percentiles, Box Plot
5	Measure of Dispersion: Alegebraic and Graphical measures, Range, Quartile Deviation, The Mean Deviation, Variance, Standard Deviation
6	Shape of Data: Skewness. Describing the distribution of data via Chebyshev Rule and Empirical Rule.
7	Probability, Basic Terminologies, Axioms of Probability, Equally Likely, Randomness, Biasedness, Permutation and Combination
8	Probability Rules: Addition Rule, Mutually Exclusive, Not Mutually Exclusive, Collectively Exhaustive Events
<b>Mid-Term Exam</b>	
9	Conditional Probability. Multiplication Rule, Independent events, dependent events and Bayes' Rule.
10	Random variables. Discrete and continuous Random variables.
11	Expectation and variance for Discrete and continuous Random variables
12	The Binomial Probability Distribution. The Poisson Probability Distribution
13	The Hyper geometric Probability Distribution. The Negative Binomial Probability Distribution
14	Continuous Probability Distributions. Properties of Continuous Probability Distributions. Mean, Variance and CDF in Continuous Probability
15	The Uniform Probability Distribution. The Normal Probability Distribution.
16	The normal approximation to the binomial distribution. The exponential distribution.



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### Grading Policy:

S.No	Grading	% of Total Marks
1	Assignments	20
2	Quizzes	20
3	Mid-term Exam	20
4	Final Exam	40
	<b>Total</b>	<b>100</b>