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Course Code: MAT132

Semester: I

## PROBABILITY AND STATISTICS

### Course Objective:

This course will help the learner to study the key concepts in Probability, Statistical Distributions, Correlation and Regression analysis and various sampling techniques so as to understand Engineering subjects such as statistical theory of communication, machine learning techniques etc.

### UNIT - I

15 Periods

**Probability:** Concept of experiments - Sample space - Event - Definition of combinatorial Probability - Conditional Probability - Baye's Theorem, concept of Random variables.

**Probability distributions:** Discrete & continuous distributions - Binomial and Poisson distributions - Uniform, Exponential, Normal distributions. Introduction to asymmetric distributions - Chi squared, t, F.

**Expected values and moments:** Mathematical expectation and its properties - Moments (including variance) and their properties- interpretation - Moment generating function.

### UNIT - II

10 Periods

**Introduction to Statistics:** Definition of Statistics - Basic objectives - Applications in various branches of science with examples

**Collection of Data:** Internal and external data - Primary and secondary Data - Population and sample - Representative sample

**Descriptive Statistics:** Classification and tabulation of Univariate data - Graphical representation - Frequency curves

### UNIT - III

10 Periods

**Descriptive measures:** Central tendency and dispersion - Bivariate data - Summarization, marginal and conditional frequency distribution - Scatter diagram - Linear regression and correlation - Least squares method - Rank correlation.

### UNIT - IV

10 Periods

**Sampling Techniques:** Random sampling - Sampling from finite and infinite populations - Estimates and standard error (sampling with replacement and sampling without replacement) - Sampling distribution of sample mean - stratified random sampling.

### TEXTBOOKS

1. S. M. Ross. *Introduction of Probability Models*, Academic Press, New York, Eleventh Edition, 2014
2. Goon, M. Gupta and B. Dasgupta. *Fundamentals of Statistics, Vol. I & II*, World Press, 2013.

**REFERENCES**

1. S. M. Ross. *A first course in Probability*, Prentice Hall, Ninth Edition, 2015
2. R. Miller, J.E. Freund and R. Johnson. *Probability and Statistics for Engineers*, PHI, Ninth Edition, 2017.
3. M. Mood, F.A. Graybill and D.C. Boes. *Introduction to the Theory of Statistics*, McGraw Hill Education, Third Edition, 1973

**UNITWISE LEARNING OUTCOMES**

Upon successful completion of each unit, the learner will be able to

Unit I	<ul style="list-style-type: none"><li>• Interpret how probability can be described and apply the probability techniques to solve various problems</li><li>• Study the probability distributions and their applications</li></ul>
Unit II	<ul style="list-style-type: none"><li>• Analyze the concepts of statistics and their applications in various branches of science</li><li>• Classify the diagrammatic representations, frequency distribution and their applications</li></ul>
Unit III	<ul style="list-style-type: none"><li>• Apply various measures of averages and deviations to analyze data</li><li>• Study the relationship between the variables along with straight line form</li></ul>
Unit IV	<ul style="list-style-type: none"><li>• Understand the concepts of sampling theory and their applications</li><li>• Apply various sampling techniques to analyze data</li></ul>

**COURSE LEARNING OUTCOMES**

Upon successful completion of this course, the learner will be able to

- Analyze the concepts of probability and its applications
- Apply various distributions to solve problems in various domains
- Understand various measures of averages and deviations to analyze data
- Study and analyze the relationship between the bivariate data
- Provide the concepts of sampling theory and techniques to analyze data
- Apply various large sample tests and applications to analyze data