

## Statistics I

**Course Title:** Statistics I  
**Course No:** STA164  
**Nature of the Course:** Theory + Lab  
**Semester:** II

**Full Marks:** 60 + 20 + 20  
**Pass Marks:** 24 + 8 + 8  
**Credit Hrs:** 3

**Course Description:** This course contains basics of statistics, descriptive statistics, probability, sampling, random variables and mathematical expectations, probability distribution, correlation and regression.

**Course Objectives:** The main objective of this course is to impart the knowledge of descriptive statistics, correlation, regression, sampling, theoretical as well as applied knowledge of probability and some probability distributions.

### **Course Contents:**

#### **Unit 1: Introduction (4 Hrs.)**

Basic concept of statistics; Application of Statistics in the field of Computer Science & Information technology; Scales of measurement; Variables; Types of Data; Notion of a statistical population

#### **Unit 2: Descriptive Statistics (6 Hrs.)**

Measures of central tendency; Measures of dispersion; Measures of skewness; Measures of kurtosis; Moments; Steam and leaf display; five number summary; box plot

Problems and illustrative examples related to computer Science and IT

#### **Unit 3: Introduction to Probability (8 Hrs.)**

Concepts of probability; Definitions of probability; Laws of probability; Bayes theorem; prior and posterior probabilities

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#### **Unit 4: Sampling (3 Hrs.)**

Definitions of population; sample survey vs. census survey; sampling error and non sampling error; Types of sampling

#### **5. Random Variables and Mathematical Expectation (5 Hrs.)**

Concept of a random variable; Types of random variables; Probability distribution of a random variable; Mathematical expectation of a random variable; Addition and multiplicative theorems of expectation

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**Unit 6: Probability Distributions (12 Hrs.)**

Probability distribution function, Joint probability distribution of two random variables; Discrete distributions: Bernoulli trial, Binomial and Poisson distributions; Continuous distribution: Normal distributions; Standardization of normal distribution; Normal distribution as an approximation of Binomial and Poisson distribution; Exponential, Gamma distribution

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**Unit 7: Correlation and Linear Regression (7 Hrs.)**

Bivariate data; Bivariate frequency distribution; Correlation between two variables; Karl Pearson's coefficient of correlation( $r$ ); Spearman's rank correlation; Regression Analysis: Fitting of lines of regression by the least squares method; coefficient of determination

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**Laboratory Works:**

The laboratory work includes using any statistical software such as Microsoft Excel, SPSS, STATA etc. whichever convenient using Practical problems to be covered in the Computerized Statistics laboratory

**Practical problems**

S. No.	Title of the practical problems	No. of practical problems
1	Computation of measures of central tendency (ungrouped and grouped data) Use of an appropriate measure and interpretation of results and computation of partition Values	1
2	Computation measures of dispersion (ungrouped and grouped data) and computation of coefficient of variation.	1
3	Measures of skewness and kurtosis using method of moments, Measures of Skewness using Box and whisker plot.	2
4	Scatter diagram, correlation coefficient (ungrouped data) and interpretation. Compute manually and check with computer output.	1
5	Fitting of lines of regression (Results to be verified with computer output)	1
6	Fitting of lines of regression and computation of correlation coefficient, Mean residual sum of squares, residual plot.	1
7	Conditional probability and Bayes theorem	3
8	Obtaining descriptive statistics of probability distributions	2
9	Fitting probability distributions in real data (Binomial, Poisson and Normal)	3
	<b>Total number of practical problems</b>	<b>15</b>

**Text Books:**

1. Michael Baron (2013). Probability and Statistics for Computer Scientists. 2<sup>nd</sup> Ed., CRC Press, Taylor & Francis Group, A Chapman & Hall Book.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, & Keying Ye (2012). Probability & Statistics for Engineers & Scientists. 9<sup>th</sup> Ed., Printice Hall.

**Reference Books:**

1. Douglas C. Montgomery & George C. Ranger (2003). Applied Statistics and Probability for Engineers. 3<sup>rd</sup> Ed., John Wiley and Sons, Inc.
2. Richard A. Johnson (2001). Probability and Statistics for Engineers. 6<sup>th</sup> Ed., Pearson Education, India