Statistics I

Course Title: Statistics I
Course No: STA169
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
	Total number of practical problems	**15**

Text Books:

1. Michael Baron (2013). Probability and Statistics for Computer Scientists. 2nd 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. 9th Ed., Printice Hall.

Reference Books:

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