

Program: BS (CS+IT)-4th
Course Name: Probability and Statistics
Course Code: MT-411
Course Hours: 03
Total Weeks: 16
Total Hours : 48

Course Objectives

The basic concepts of this course is to know about various statistical descriptive and their role in practical life/computer science. In addition, it also highlights the role of probability and probability distributions in computer science and information technology. It also include regression and correlation analysis, used for establishing relation between or among different variables

Week-1

- Introduction to Probability and Statistics
- Constant, Variables, Data, Types of Variables and data
- Qualitative and Quantitative Variables and data
- Discrete and continues variables and data
- Primary and Secondary data
- Individual, Population and Sample
- Parameter and Statistic
- Descriptive and Inferential Statistics

Week-2

- Measure of Central Tendency
- Arithmetic Mean
- Median
- Quantiles

Week-3

- Quantiles
- Measure of Dispersion
- Variance and Standard Deviation
- Co-efficient of Variation

Week-4

- Probability
- Sets, Subsets, Operations on sets
- Random Experiment
- Sample Space

Week-5

- Events, Dependent and Independent events, Mutually exclusive and collective exhaustive events.
- Counting Sample Space, Rules of (Multiplication, Permutation, Combination) with examples.

Week-6

- Subjective and Objective (Priori, Posteriori) Probability with examples.
- Laws of Probability with examples
- Conditional Probability with examples
- Bayes theorem with examples

Week-7

- Random Variables
 - Introduction
 - Distribution function
 - Discrete random variables
 - Probability distribution of discrete random variables
 - Properties of discrete Probability distribution
 - Examples of discrete Probability distribution

Week-8

- Continuous random variables
- Probability distribution of Continuous random variables
- Properties of Continuous Probability distribution
- Examples of continuous Probability distribution

Week-09

- Sampling
- Sampling with and without replacement
- Probability Sampling
 - Simple random sampling
 - Systematic random sampling

Week-10

- Stratified random sampling
- Cluster sampling
- Non-Probability Sampling
- Purposive sampling
- Quota sampling

Week-11

- Sampling Distribution
 - Sampling Distribution of sampling mean
 - Real life examples

Week-12

- Sampling Distribution of Z
- Sampling Distribution of t
- Sampling Distribution of χ^2 (chi-square)

Week-13

- Statistical inference estimation
 - Estimation and testing of hypotheses
 - Estimate and Estimator
 - Point Estimation
 - Criteria for good point estimation
 - Unbiasedness, Consistency, Efficiency, Sufficiency

Week-14

- Statistical inference: Hypothesis Testing
 - Introduction
 - Procedures for testing of Hypotheses
 - Type-I and Type-II errors in testing of hypotheses
- Testing Hypothesis about Mean of a Normal Population when Population Standard Deviation (σ) is known
- Procedures of Hypothesis using critical region approach
- Procedures of Hypothesis using p-value approach
- Some real life examples from computer Science field
- Testing Hypothesis about Mean of a Normal Population when Population Standard Deviation (σ) is unknown but sample size is greater than 30.

Week-15

- Procedures of Hypothesis using critical region approach
- Procedures of Hypothesis using p-value approach
- Some real life examples from computer Science field
- Practical Examples of the above two lectures

Week-16

- Simple Regression and Correlation
 - Introduction
 - Deterministic and Probabilistic Relations of Models
 - Scatter Diagram
 - Interpretation of Scatter Diagram
- Simple Linear Regression Model or Equation
- Variables, Parameters and residual in Simple Linear Regression Model or Equation
- Assumptions of Simple Linear Regression Model or Equation
- Applications of Simple Linear Regression Model or Equation

- Multiple Regression
 - Introduction
 - Multiple Linear Regression Model
 - Assumptions
 - Variable and Parameters
- Multiple Linear Regression with two Parameters
- Applications
- Real Life Applications of Multiple Linear Regression with two Parameters

TOTAL MARKS : 100

RECOMMENDED BOOKS :

Introduction to Statistical Theory Part-I by Sher Muhammad Chaudry.

Reference Materials:

1. Probability and Statistics for Engineers and Scientist by Ronald, W. Myers, Y. 2008,8th edition .Prentice Hall Publisher.
2. Probability and Statistics for Engineering and Sciences by Jay, L. Devore 2003.Duxbury Publisher.
3. Statistical Data Analysis. G. Cowan. 1998. Clarendon and Oxford.