

Title of the Course: Computer Oriented Statistical Techniques

Programme: B.Sc. (Information Technology) Semester IV

Syllabus for 4 credit Course From the academic year- 2024-2025

Sr. No.	Heading	Particulars
1	Description of the course:	This course delves into statistical methods and techniques essential for analyzing and interpreting data. Topics include measures of central tendency and dispersion, moments, skewness, kurtosis, sampling theory, statistical estimation and decision theory, the method of least squares, and correlation theory. Students will gain a comprehensive understanding of statistical analysis and its applications in various fields.
2	Vertical :	Minor
3	Type :	Theory
4	Credit:	4 credits
5	Hours Allotted :	60 Hours
6	Marks Allotted:	100 Marks Continuous Evaluation: 40 Marks Semester-End: 100 Marks
7	Course Objectives:	<ul style="list-style-type: none">• To acquaint students with fundamental measures of central tendency and dispersion, enabling them to summarize and interpret data effectively.• To provide a thorough understanding of sampling theory, including random sampling techniques and sampling distributions, essential for making inferences about populations based on sample data.• To introduce students to statistical estimation and decision theory, including point and interval estimation,• To introduce students to hypothesis testing, and decision-making procedures, facilitating informed decision-making in practical scenarios.
8	Course Outcomes:	<ul style="list-style-type: none">• Students will be proficient in computing and interpreting measures of central tendency and dispersion, such as mean, median, mode, standard deviation, and variance, for both raw and grouped data.• They will develop the skills to analyze and interpret moments, skewness, and kurtosis, gaining insights into the shape and distribution of data.• By the end of the course, students will be able to apply statistical estimation and decision-making techniques, including constructing confidence intervals, conducting hypothesis tests, and implementing control charts,• Students will be able to draw meaningful conclusions from data and make informed decisions.
9	Module 1: Measures of Central Tendency and Measures of Dispersion	
		<ul style="list-style-type: none">• Index, or Subscript, Notation, Summation Notation, Averages, or Measures of Central Tendency, The Arithmetic Mean , The Weighted Arithmetic Mean ,Properties of the Arithmetic Mean, The Arithmetic Mean Computed from Grouped Data, The Median ,The Mode, The Empirical Relation Between the Mean, Median, and Mode, The Geometric Mean G, The Harmonic Mean H ,The Relation Between the Arithmetic, Geometric, and Harmonic Means, The Root Mean Square, Quartiles, Deciles, and Percentiles, Software and Measures of Central Tendency.

- Dispersion, or Variation, The Range, The Mean Deviation, The Semi- Interquartile Range, The 10–90 Percentile Range, The Standard Deviation, The Variance, Short Methods for Computing the Standard Deviation, Properties of the Standard Deviation, Charlie’s Check, Sheppard’s Correction for Variance, Empirical Relations Between Measures of Dispersion, Absolute and Relative Dispersion; Coefficient of Variation, Standardized Variable; Standard Scores, Software and Measures of Dispersion.

Module 2: Moments, Skewness, and Kurtosis & Sampling Theory

- Moments, Moments for Grouped Data, Relations Between Moments, Computation of Moments for Grouped Data, Charlie’s Check and Sheppard’s Corrections, Moments in Dimensionless Form, Skewness, Kurtosis, Population Moments, Skewness, and Kurtosis, Software Computation of Skewness and Kurtosis.
- Sampling Theory, Random Samples and Random Numbers, Sampling with and Without Replacement, Sampling Distributions, Sampling Distribution of Means, Sampling Distribution of Proportions, Sampling Distributions of Differences and Sums, Standard Errors, Software Demonstration of Elementary Sampling Theory.

Module 3: Statistical Theory and Statistical Decision Theory

- Estimation of Parameters, Unbiased Estimates, Efficient Estimates, Point Estimates and Interval Estimates; Their Reliability, Confidence-Interval Estimates of Population Parameters, Probable Error.
- Statistical Decisions, Statistical Hypotheses, Tests of Hypotheses and Significance, or Decision Rules, Type I and Type II Errors, Level of Significance, Tests Involving Normal Distributions, Two-Tailed and One-Tailed Tests, Special Tests, Operating-Characteristic Curves; the Power of a Test, p-Values for Hypotheses Tests, Control Charts, Tests Involving Sample Differences, Tests Involving Binomial Distributions.

Module 4: Method of Least Squares & Correlation Theory

- Relationship Between Variables, Curve Fitting, Equations of Approximating Curves, Freehand Method of Curve Fitting, The Straight Line, The Method of Least Squares, The Least-Squares Line, Nonlinear Relationships, The Least-Squares Parabola, Regression, Applications to Time Series, Problems Involving More Than Two Variables.
- Correlation and Regression, Linear Correlation, Measures of Correlation, The Least-Squares Regression Lines, Standard Error of Estimate, Explained and Unexplained Variation.

Reference Books:

Author/s: Murray R. Spiegel, Larry J. Stephens, **Title:** statistics, **Publisher:** Mc GRAW – HILL INTERNATIONAL, **Edition:** fourth

Internal Continuous Assessment: 40%

Semester End Examination : 60%

Continuous Evaluation through:

Practical Assessment

Format of Question paper:

Scheme of Evaluation Pattern
Table 1A: Scheme of Continuous Evaluation (CE/Practical)
Scheme of Evaluation Pattern

Sub-components	Maximum Marks	Conditions for passing
1) Practical exam	30	a) A learner must be present for each of the sub-components.
2) Journal and Viva	10	
Total	40	

Table 1B: Scheme of Semester End Examination (SEE) Evaluation
Question Paper Pattern for Semester End Examination (SEE)

Maximum Marks: 60

Duration: 2 Hrs.

Note: All questions are compulsory. Each question has an internal choice.

Question Number	Nature of Questions		Maximum Marks
1)	Attempt any 3		
	a)		15
	b)		
	c)		
	d)		
	e)		
2)	Attempt any 3		
	a)		15
	b)		
	c)		
	d)		
	e)		
3)	Attempt any 3		
	a)		15
	b)		
	c)		
	d)		
	e)		
4)	Attempt any 3		
	a)		15
	b)		
	c)		
	d)		
	e)		