Code: ST322

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE

of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

60 hrs
(4 hrs/ week)
4 Credits

B.Sc. II Year (CBCS): Statistics Syllabus

(Examination at the end of III Semester)

(To be implemented for the students joined in 2023-24)

Semester III

Course Name: Statistical Methods and Inference I

Course Objectives:

The objective of the course is,

COB1: *To learn the concept of association between categorical variables and also to forecast the trend line.*

COB2: *To understand the concept of relationship between two variables and forecast future values by regression equations.*

COB3: *To Recognize the characteristics of a sampling distribution and aware of estimation.*

COB4: *To Understand the fundamentals of classical inference involving confidence intervals and hypothesis testing.*

UNIT - I **(15)**

Curve Fitting: Fitting of a straight line, quadratic, exponential and power curves.

Analysis of categorical data: Definition of attributes. Independence, association and partial association of attributes, various measures of association (Yule's) for 2 –way data and coefficient of contingency (Pearson and Tcherprow) and coefficient of colligation with real life examples

UNIT - II **(15)**

Correlation & Regression: Product moment correlation coefficient and its properties. Bivariate data, scattered diagram, computation of correlation coefficient for grouped data, Spearman's Rank correlation coefficient and its properties, correlation ratio. Partial and multiple correlation coefficients (only for three variables. Simple linear regression, lines of regression, properties of regression coefficients, correlation verses regression, Multiple Linear Regression (Two independent variables), coefficient of determination- R^2.

UNIT - III **(15)**

Sampling distribution: Concept – Population, Sample, parameter, statistic, sampling distribution and standard error and its application. Definitions of exact sampling distributions-statements and properties of chi-square, t and F distributions and their interrelationships. Independence of sample mean and variance in random sampling from normal distributions.

Estimation: Point Estimation – Distinction between Estimator and Estimate – Properties of Estimators – Concept of Unbiasedness & Sufficiency, Statement of Neyman's Factorization theorem – Simple Applications.

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UNIT - IV **(15)**

Estimation (Continued): Concept of Consistency &Efficiency and its Simple Applications.

Methods of Estimation: Maximum likelihood estimator (MLE) and their properties – Simple problems on MLE – Method of moments – Simple illustrations.

Interval estimation – Concept, Distinction between point estimation and interval estimation - Confidence interval and confidence limits

Course Outcomes:

Upon successful completion of the course, students able to:

CO1: *Demonstrate the applicability of analyzing the categorical data.*

CO2: *Compute and interpret Correlation Analysis, regression lines and multiple regression analysis with applications.*

CO3: *apply point and interval estimation techniques to estimate the population mean, proportion and variance.*

CO4:*compute various properties of estimation to deal real life problems.*

List of Reference Books:

1. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand &Sons, New Delhi
2. William Feller: Introduction to Probability theory and its applications. Volume- I, Wiley
3. Goon AM, Gupta M K, Das Gupta B: Fundamentals of Statistics, Vol-II, the World press pvt. Ltd., Kolkata.
4. Hoel P.G.: Introduction to mathematical Statistics, Asia Publishing house.
5. Sanjay Arora and Bansi Lal: New mathematical Statistics: Satya Prakashan, New Delhi
6. Hogg, Tanis, Rao: Probability and Statistical Inference.7th edition. Pearson.
7. Parimal Mukhopadhyay: Mathematical Statistics. New Central Book Agency.

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1 Credit

B.Sc. II Year (CBCS): Statistics Syllabus

(Examination at the end of III Semester)

(To be implemented for the students joined in 2023-24)

Semester III

Course Name: Statistical Methods and Inference I- Practical

Course Objective:

This course aims to provide students with proficiency in using statistical software for data analysis using the principle of least squares, correlation, Regression analysis, and simulation of random numbers.

COB 1: To learn computational skills to implement various large sample test procedures using Excel and R.

COB 2: To Learn the simulation of data, the principle of least squares for forecasting the data using Excel and R.

List of practicals:

1. Simulation of random samples from Uniform (0,1), Uniform (a, b), Exponential, Normal, Binomial and Poisson distributions (MS Excel and R Programming).
2. Fitting straight line and parabola by the least-squares method (MS Excel and R Programming).
3. Fitting of Exponential Curves by the method of least squares (MS Excel and R Programming).
4. Fitting of power curves by the method of least squares (MS Excel and R Programming).
5. Computation of correlation coefficient, forming regression lines (MS Excel and R Programming).
6. Computation of partial correlation coefficients (MS Excel and R Programming).
7. Computation of Multiple correlation coefficients (MS Excel and R Programming).

Course Outcome:

CO 1: *Handle and process the data using the techniques correlation and regression analysis by Excel and R- programming.*

CO 2: *Handle and process the data using the techniques least squares and simulation by Excel and R-programming.*

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60 hrs
(4 hrs/ week)
4 Credits

B.Sc. II Year (CBCS): Statistics Syllabus

(Examination at the end of IV Semester)

(To be implemented for the students joined in 2023-24)

Semester IV

Course Name: Statistical Inference II

Course Objectives:

This course aims to,

COB1: *Understand the fundamentals of classical inference.*

COB2: *Demonstrate the use of large sample tests and its applications.*

COB3: *Understand the applications of exact sampling distributions.*

COB4: *Perceive an in-depth presentation and analysis of the most common methods and techniques of nonparametric statistics.*

UNIT - I **(15)**

Hypothesis and General Test Procedures: Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests, most powerful test and test function (non-randomized and randomized).
Neymann - Pearson's fundamental lemma for Randomized tests. Examples in case of Binomial, Poisson, Exponential and Normal distributions and their powers. Use of central limit theorem in testing.

UNIT – II **(15)**

Large Sample Tests: Large sample tests for attributes and variables – Proportion(s), Mean(s), Standard deviation(s), Correlation(s); confidence intervals for mean(s), proportion(s).

UNIT - III **(15)**

Small Sample Tests: Tests of significance based on $\chi 2$, t and F. $\chi 2$-test for goodness of fit, Single variance and test for independence of attributes. t – test for test for single mean, two mean(independent and dependent). F- test for difference of variances. Definition of order statistics and statement of their distributions.

UNIT - IV **(15)**

Non-Parametric Tests: Concepts of distribution free tests, Their advantages and disadvantages, comparison with parametric tests. One sample run test, sign test and Wilcoxon-signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon –Mann-Whitney U test, Wald Wolfowitz's runtest.

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Course Outcomes:

Upon successful completion of the course, students able to:

CO1: *Apply various estimation and testing procedures to real life problems.*

CO2: *Acquire techniques to test hypotheses related to population means, proportions and variances under different circumstances.*

CO3: *Grab the knowledge of inferential statistics and their applications in real-life business situations.*

CO4: *Apply distribution free test to deal with real time problems.*

List of Reference Books:

1. V.K. Kapoor and SC. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Sanjay Arora and Bansi Lal: New mathematical Statistics: Satya Prakashan, New Delhi.
3. Hogg and Craig: Introduction to Mathematical Statistics. Printis Hall
4. Parimal Mukhopadhyay: Mathematical Statistics. New Central Book Agen
5. Goon AM, Gupta mk, Das Gupta B: Fundamentals of Statistics, Vol-II, the World press pvt. Ltd., Kolakota
6. Hoel PG: Introduction to mathematical Statistics, Asia Publishing house.
7. Hogg,Tanis,Rao: Probability and Statistical Inference.7th edition. Pearson.
8. William Feller: Introduction to Probability theory and its applications. Volume- I, Wiley Publication
9. Sanjay Arora and Bansi Lal: New mathematical Statistics: Satya Prakashan, New Delhi.
10. Mood AM, Graybill FA, Boe's DC Introduction to theory of statistics. TMH.
11. Paramiteya mariyu aparameteya parikshalu. Telugu Academy.
12. Gerald Keller: Applied Statistics with Microsoft excel. Duxbury. Thomson Learning
13. Levin, Stephan, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel. 4th edition. Pearson Publication.

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30 hrs
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1 Credit

B.Sc. II Year (CBCS): Statistics Syllabus

(Examination at the end of IV Semester)

(To be implemented for the students joined in 2023-24)

Semester IV

Course Name: Statistical Inference II - Practical

Course Objective:

This course aims to provide Students will effectively use professional-level technology tools to implement various statistical inferential approaches.

Unit wise Course Objective:

COB 1: To learn computational skills to implement various large sample test procedures using Excel and R.

COB 2: To learn computational skills to implement various small sample test procedures using Excel and R.

List of practicals:

1. Test for single proportion (MS Excel and R Programming).
2. Test for difference between proportions (MS Excel and R Programming)
3. Test for single mean (MS Excel and R Programming).
4. Test for difference between means (MS Excel and R Programming).
5. Test for single variance (MS Excel and R Programming).
6. Test for equality variances (MS Excel and R Programming).
7. Test for correlation coefficient (MS Excel and R Programming).
8. χ^2 tests for goodness of fit (MS Excel and R Programming).
9. χ^2 tests for independence of attributes (MS Excel and R Programming).

Course Outcome:

CO 1: Handle and process the data using large sample test procedures using Excel and R.

CO 2: Handle and process the data using small sample test procedures using Excel and R.

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B.Sc. II Year (CBCS): Statistics SEC Syllabus

(Examination at the end of VI Semester)

(To be implemented for the students joined in 2023-24)

Wef the academic year: 2023-24

Semester III

SEC Course Name: Data Analysis Using SPSS – I

30 hrs
(2 hrs/ week)
2 Credits

Course Objectives:

This course aims to,

COB1: To introduce the basic practice of statistics by using SPSS Statistics, a statistical software program used for data management and data analysis.

COB2: To learn how to perform basic statistical analysis.

UNIT –I **(15 hrs)**

Introduction to SPSS: Introduction, Data Analysis with SPSS: general aspects, work flow, Entering data into SPSS Editor, Inserting and defining variables, Data entry, Data Editor. Sorting, Transposing, Splitting and Merging.

UNIT –II **(15 hrs)**

Graphical Representation of Statistical data: Chart builder, Histograms, line Charts, Bar Charts, box plots, Error bar, Pie Charts, Scatter Plots (Simple, grouped, drop-line), Editing graphs and Axes.

Descriptive Analysis of data: Frequency tables, using frequency tables for analyzing data (Central tendency and dispersion).

Course Outcomes:

Upon successful completion of the course, students able to:

CO1: Understand the basic work flow of SPSS.

CO2: demonstrate the visualization of data and perform basic statistical analysis.

List of Reference Books:

1. SPSS for windows step by step - Darren George, Paul Mallery
2. SPSS: Stats practically short and simple – Sidney Tyrrell.

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B.Sc. II Year (CBCS): Statistics SEC Syllabus

(Examination at the end of VI Semester)

30 hrs
(2 hrs/ week)
2 Credits

(To be implemented for the students joined in 2023-24)

Wef the academic year: 2023-24

Semester IV

SEC Course Name: Data Analysis Using SPSS – II

Course Objectives:

This course aims to,

COB1: To familiarize the correlation and regression techniques used in data analytics.

COB2: To learn how to perform inferential statistical analysis.

UNIT –I **(15 hrs)**

Correlation and Regression: Scatter plots, Pearson's Correlation, Spearman Correlation and Partial Correlation, Linear Regression and Multiple Regression – predicted unstandardized & standardized-Residuals values – Unstandardized & Standardized with Simple examples.

UNIT –II **(15 hrs)**

Statistical testing: Sample and Population, Concept of confidence Interval, One sample t-test, Independent Samples t-test, Paired Samples t-test and F-test, Cross tabulation and Chi Square analysis.

Time Series Analysis: Simple forecasting techniques

Course Outcomes:

Upon successful completion of the course, students able to:

CO1: Demonstrate proficiency in applying the regression models to predict the future values.

CO2: Select an appropriate statistical test for analyzing data.

List of Reference Books:

1. SPSS for windows step by step - Darren George/Paul Mallery
2. SPSS: Stats practically short and simple – Sidney Tyrrell.

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