BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620 024.

CENTRE FOR DISTANCE AND ONLINE EDUCATION

ALLIED STATISTICS for

B.Sc. Data Science & B.Sc. Geography Programmes

(Applicable to the candidates admitted from the academic year 2026-27 onwards)

ALLIED COURSE I
STATISTICS I
(Theory)

COURSE OBJECTIVES:

- To learn the statistical foundations for Data Science
- To learn how to implement various
- Explain how statistical methods used in data science

Unit I

Introduction to Statistics: Introduction - The Nature of Statistics - Data Collection - Inferential Statistics and Probability Models - Populations and Samples - Stratified Random Sampling

Unit II

Describing Data Sets: Introduction- Frequency tables and graphs- Grouped Data and Histograms- Stem and Leaf plots- Sets of paired Data.

Unit III:

Using Statistics to Summarize the Data Sets: Introduction- Sample mean- Sample median- Sample mode-Sample variance and sample standard deviation- Normal data sets and empirical rules- Sample correlation coefficient.

Unit IV:

Discrete Random Variables: Introduction - Random Variables-Expected Value - Variance of Random Variables - Binomial Random Variables -Hypergeometric Random Variables Poisson Random Variables .

Unit V:

Normal Random Variables - Continuous Random Variables - Normal Random Variables - Probabilities Associated with a Standard Normal Random Variable - Finding Normal Probabilities: Conversion to the Standard Normal - Additive Property of Normal Random Variables Percentiles of Normal Random Variables

Unit VI: Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

REFERENCES:

1. Sheldon M. Ross, "Introductory Statistics", Academic Press of Elsevier, 4th Edition 2017. (Unit1: Chapter 1; Unit2: Chapter 2; Unit3: Chapter 3; Unit4: Chapter 5; Unit5: Chapter 6)
2. Deborah J. Rumsey, "Statistics II for Dummies", Wiley, 2021.
3. Allen B. Downey, "Think Stats Probability and Statistics for Programmers", Green Tea Press, 2011
4. Peter Bruce and Andrew Bruce, "Practical Statistics for Data Scientists", O'Reilly Media, Inc., 2017
5. http://www.ru.ac.bd/stat/wp-content/uploads/sites/25/2019/03/102_03_Weiss-Introductory-Statistics-2017.pdf
6. https://www.youtube.com/playlist?list=PL7y-1rk2cCsA339crwXMWUaBRuLBvPBCg

COURSE OUTCOMES:

Upon successful completion of this course the students would be able to:

- Describe the fundamentals of data sets.
- Identify and apply the concepts of basic statistics
- Apply data analytics for real world problems
- Explore discrete random variables.
- Implement continuous random variables.

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ALLIED PRACTICAL
STATISTICS FOR DATA SCIENCE
LAB
(Practical)

COURSE OBJECTIVES:

- To learn practical training in SPSS
- To demonstrate statistics using SPSS
- To analyze various problems using SPSS

1. Find Mean, Median and Mode using SPSS.
2. Calculate Standard deviation and variance using SPSS.
3. Demonstrate Bar diagram in SPSS.
4. Construct Line diagram in SPSS.
5. Demonstrate Pie chart in SPSS
6. Construct Histograms in SPSS.
7. Explore t-test for one sample problem.
8. Analyze t-test for two sample problems.
9. Demonstrate t-test for testing the significance of Correlation Coefficient in SPSS.
10. Implement the analysis of variance using SPSS.
11. Read Data from Database using SPSS.
12. Demonstrate how to handle Missing data in SPSS.
13. Show Summary Measures for Categorical Data in SPSS.
14. Construct Charts for Categorical Data in SPSS
15. Construct Pivot tables in SPSS.
16. Find the Co efficient of correlation using SPSS.
17. Find the Regression equation of X on Y.
18. Formulate the Regression equation of Y on X.
19. Apply One-tailed Test with an example using SPSS.
20. Implement Two-tailed test with a sample problem in SPSS.

Course Outcomes:

Upon successful completion of this course the students would be able to:

1. Relate the use of SPSS to analyze the problems
2. Create charts and plots in SPSS
3. Understand the concept of T-test
4. Understand the usage of analysis of variance using SPSS
5. Analyze problems related to standard deviation

Data Science graduates develop a strong range of transferable skills including excellent numerical, problem-solving and analytical abilities. The students can continue in academia, studying for either a Statistics, Artificial Intelligence, Data/Business Analytics, Machine Learning related Masters or PhD.

Graduates from the Department of Data Science enter a diverse range of careers. Many opt to work within the Financial Services sector with the Actuarial, Accounting and Investment Banking opportunities being particular favorites.

Frequent career choices include e-Commerce, Business and Industrial Consultancy (Start a Data Mining Consultancy Service, Start a Data Analytics Blog, Start a Financial Service Business, Start a CRM Service) Operational Research, Marketing, Scientific Research, and Government.

Career opportunities

- Data scientists are in high demand and career opportunities are plentiful.
- The graduates of Data Science will be well prepared to embark on a wide variety of careers, for example:
- Industry: Industry is consistently short of people equipped to take on the deep analysis of data.
- Data Science graduates will be well placed to help fill this gap.
- Opportunities exist with companies in areas such as Information technology, Manufacturing, Pharmaceuticals, Finance, Telecoms, Market research, and a growing number of other areas.

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ALLIED COURSE II
STATISTICS II
(Theory)

COURSE OBJECTIVES:

- To learn the statistical foundations for Data Science
- To learn how to implement various
- Explain how statistical methods used in data science

UNIT – I:

Distributions of Sampling - Sample Mean - Central Limit - Sampling Proportions from a Finite Population - Distribution of the Sample Variance of a Normal Population Testing Statistical Hypotheses - Hypothesis Tests and Significance Levels - Tests Concerning the Mean of a Normal Population: Case of Known Variance - The t Test for the Mean of a Normal Population: Case of Unknown Variance- Hypothesis Tests Concerning Population Proportions

UNIT – II:

Hypothesis Tests Concerning Two Populations - Testing Equality of Means of Two Normal Populations: Case of Known Variances - Testing Equality of Means: Unknown Variances and Large Sample Sizes - Testing Equality of Means: Small-Sample Tests when the Unknown Population Variances Are Equal Paired-Sample t Test - Testing Equality of Population

UNIT - III:

Analysis of Variance - One-Factor Analysis of Variance - A Remark on the Degrees of Freedom - Two-Factor Analysis of Variance: Introduction and Parameter Estimation - Two-Factor Analysis of Variance: Testing Hypotheses

UNIT - IV:

Linear Regression: Simple Linear Regression Model - Estimating the Regression Parameters - Error Random Variable Testing the Hypothesis that $\beta = 0$ - Regression to the Mean - Prediction Intervals for Future Responses - Coefficient of Determination - Sample Correlation Coefficient - Analysis of Residuals: Assessing the Model - Multiple Linear Regression Model

UNIT - V:

Chi-Squared Goodness-of-Fit Tests: Chi-Squared Goodness-of-Fit - Testing for Independence in Populations Classified According to Two Characteristics - Testing for Independence in Contingency Tables with Fixed Marginal Totals - Nonparametric Hypotheses - Sign test – Signed Rank test

Unit VI: Current Contours (for Continuous Internal Assessment Only):

Contemporary Developments Related to the Course during the Semester Concerned.

REFERENCES:

1. Sheldon M. Ross, "Introductory Statistics", Academic Press of Elsevier, 4th Edition 2017. (Unit1: Chapter7, 9; Unit2: Chapter10; Unit3: Chapter11; Unit4: Chapter12; Unit5: Chapter13,14)
2. Deborah J. Rumsey, "Statistics II for Dummies", Wiley, 2021.
3. Allen B. Downey, "Think Stats Probability and Statistics for Programmers", Green Tea Press, 2011
4. Peter Bruce and Andrew Bruce, "Practical Statistics for Data Scientists", O'Reilly Media, Inc., 2017.
5. http://www.ru.ac.bd/stat/wp-content/uploads/sites/25/2019/03/102_03_Weiss-Introductory-Statistics-2017.pdf
6. https://www.youtube.com/playlist?list=PL7y-1rk2cCsA339crwXMWUaBRuLBvPBCg

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