

**B.A (Prog.) with Human Development and Family Empowerment (HDFE)****Category-V**
**DISCIPLINE SPECIFIC ELECTIVE COURSE  
DSE-11-HDFE: DATA ANALYSIS AND STATISTICAL TOOLS**
**Credit Distribution, Eligibility and Pre-requisites of the Course**

Course Title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the course
		Lecture	Tutorial	Practical/ Practice		
<b>Data Analysis and Statistical Tools</b>	4	3	-	1	Class XII	Nil

**LEARNING OBJECTIVES**

- To provide an understanding of the fundamental statistical concepts.
- To enable learners to collect, organize, and summarize data using appropriate tables, graphs, and statistical methods.
- To gain the ability to compute and interpret measures of central tendency and variability in research datasets.
- To develop a foundational understanding of probability theory and its application in hypothesis testing.
- To acquire an understanding of the parametric and non-parametric statistical tests and application of statistical software for analysis.

**LEARNING OUTCOMES**

After completing this course, the learner will be able to:

- Explain fundamental statistical concepts and their relevance to research.
- Summarize and visualize data effectively using descriptive statistics.
- Apply inferential statistical techniques to draw meaningful conclusions from sample data.
- Interpret and communicate statistical findings in the context of research.

**SYLLABUS OF DSE-11-HDFE****THEORY****(45 hours)****UNIT 1: Fundamentals of Statistics****(15 Hours)****Unit Description:**

This unit establishes the foundational principles of statistics, focusing on its application in social sciences.

**Subtopics:**

- Definition and Scope of Statistics in Social Science and Market Research
- Types of Statistics: Descriptive vs Inferential
- Types of Data: Qualitative and Quantitative
- Measurement Scales: Nominal, Ordinal, Interval, Ratio
- Importance of Reliability and Validity

**UNIT II: Data Organization and Summarization****(15 Hours)****Unit Description:**

This unit focuses on summarizing and visualizing data for analysis and interpretation.

**Subtopics:**

- Organising data: frequency distributions tables
- Types of Graphs and their interpretation: Histogram, Pie Chart, Bar Graph, Line Graph, Frequency Polygon, Ogive
- Measures of Central Tendency: Mean, Median, Mode for ungrouped and grouped data
- Measures of Dispersion for ungrouped and grouped data: Absolute dispersion (Range, Quartile deviation, Mean deviation, Standard Deviation, Variance) and Relative dispersion (Coefficient of Range, Coefficient of Quartile deviation, Coefficient of Mean deviation, Coefficient of Variance)
- Measures of Shape: Skewness and Kurtosis
- Measures of partition values – Quartile, Decile, Percentile, Percentile Rank for ungrouped and grouped data

**UNIT III: Inferential Statistics****(15 Hours)****Unit Description:**

This unit equips students with techniques for making inferences about population from sample data.

**Subtopics:**

- Introduction to Probability: Basic concepts, Law of addition and multiplication
- Properties of Normal Distribution
- Correlation and Regression
- Sampling and Hypothesis testing:
  - Null and Alternative Hypotheses.
  - Errors in Sampling: Type I and Type II Errors.
  - Level of Significance ( $\alpha$ ) and Confidence (c)
  - One-tailed vs Two-tailed tests.
- Statistical Tests:
  - Parametric Tests: Z-test, t-tests for means (One-sample, Two-sample), F test for variance, ANOVA (One way), Karl Pearson's Coefficient of Co-relation
  - Non-Parametric Tests: Chi-square test, Spearman's Rank (repeated and Non-repeated) Correlation Coefficient
- Introduction to Computer-Aided Statistical Analysis:
  - Software: Excel, SPSS, Atlas.ti, JASP, Jamovi, NVIVO
  - Real life Application, Analysis, and Interpretation

**PRACTICAL****(Hours 30)**

1. **Introduction to Statistical Software:** Using Excel for statistical analysis by inputting basic data and performing essential Excel functions.
2. **Construction of Frequency Distributions:** Organize raw data into grouped and ungrouped frequency tables using a given dataset.
3. **Diagrammatic Representation of Data:** Visualize data using bar charts, pie charts, line graphs, histograms, and frequency polygons, and interpret the results for a given dataset.

4. **Measures of Central Tendency:** Calculate mean, median, and mode for grouped and ungrouped data in Excel, and compare central tendencies between two datasets.
5. **Measures of Dispersion:** Compute range, variance, and standard deviation in Excel to analyse the spread of two different datasets.
6. **Area under the Curve:** Calculate the area under the curve using standard scores.
7. **Correlation Analysis:** Measure the strength of relationships between two variables by calculating Pearson's and Spearman's correlation coefficients.
8. **Hypothesis Testing (One-sample and Two-sample t-test):** Test the significance of means for single, independent, and dependent datasets using t-tests.
9. **Chi-Square Test for Independence:** Test the independence between categorical variables by analysing and interpreting a contingency table.

### Essential Readings

- Minium, E. W., King, B. M., & Bear, G. (2017). *Statistical Reasoning for Psychology and Education*. New York: Wiley and Sons.
- Gupta, S.P. (2022) *Statistical Methods*, 46th Edn. S. Chand and Sons.
- Agresti, A., Christine Franklin, C. and Klingenberg, B. (2017). *Statistics: The Art and Science of Learning from data*, Pearson, Boston

### Suggested Readings

- Schmuller, J. (2016). *Statistical Analysis with Excel for Dummies*, 5th Edition, New York, USA.
- Gupta, S. C. and Kapoor, V. K. (2020). *Fundamentals of Mathematical Statistics*, 12th Edn., S. Chand and Sons.
- Ross, Sheldon M. (2010): *Introductory Statistics*, 3rd Edition, Academic Press.
- Derek Rowntree, (2018). *Statistics Without Tears, An Introduction for Non-Mathematicians*, Penguin Books

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time**