DISCIPLINE SPECIFIC ELECTIVE COURSE – DSE-7-FT: 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		
Data Analysis and Statistical Tools	4	3	0	1	Class XII	Nil

LEARNING OBJECTIVES

- To provide an understanding of the fundamental concepts of statistics.
- To enable learners to collect, organize, and summarize data using appropriate tables, graphs, and statistical methods.
- To gain the ability to compute, analyse and interpret results of datasets using basic statistical tools.

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-7-FT

THEORY
(Credits: 3; Hours: 45)

UNIT I: 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 and Inferential
- Types of Data: QualitativeandQuantitative
- 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 statistical 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 (α) 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
(Credit:1; Hours: 30)

1. **Introduction to Statistical Software**: Using spreadsheet application such as 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/ RECOMMENDED READINGS (Theory and Practical):

- 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.Chandand Sons.
- Agresti,A.,Christine Franklin,C.and Klingenberg, B.(2017).*Statistics:TheArtand Science of Learning from data*, Pearson, Boston

SUGGESTED READINGS

- Schmuller,J.(2016).*Statistical Analysis with Excel forDummies*, 5th Edition, NewYork, USA.
- Gupta,S.C.andmKapoor,V.K.(2020).*FundamentalsofMathematicalStatistics*,12thEdn., S. Chand and Sons.
- Ross,Sheldon M.(2010): *Introductory Statistics*, 3rdEdition, 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.

DISCIPLINE SPECIFIC ELECTIVE COURSE – DSE-9-FT: FOOD SAFETY AND QUALITY MANAGEMENT

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Food Safety and Quality Management	4	3	0	1	Class XII	Nil

LEARNING OBJECTIVES:

1. Understand key food quality management systems facilitating food safety.
2. Learn application of standards like ISO, HACCP, and GMP in the food industry.
3. Develop skills to develop and implement food safety plans and audits.
4. Understand the importance of regulatory compliance, food traceability and newer concepts in this area.

LEARNING OUTCOMES: