

DISCIPLINE SPECIFIC CORE COURSE
DSC HP 820: STATISTICS AND DATA MANAGEMENT IN HOME SCIENCE
RESEARCH

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		
Statistics and Data Management in Home Science DSE HP 820	4	3	0	1	Class XII	Nil

Learning Objectives

- Introduce students to basic statistical concepts and methods.
- Develop skills to organize, analyze and interpret data.
- Provide the foundation for applying statistical methods in real-world scenarios.
- Equip students with tools for making inferences from data using probability and hypothesis testing.

Learning Outcomes

The students will be able to

- Understand and apply basic statistical concepts.
- Organize and summarize data using descriptive statistics.
- Understand probability theory and apply it to various problems.
- Conduct hypothesis testing and interpret the results.

SYLLABUS OF DSC HP 820

THEORY

(Credits 3; Hours 45)

UNIT I: Introduction to Statistics, Data types, Organization and Summarization 13 Hours

In this unit, the students will be able to classify data into appropriate types and levels of measurement. They will understand the distinction between descriptive and inferential statistics. They will learn how to collect data effectively and will be able to construct and interpret various data representations.

- Definition of Statistics
- Types of statistics: Descriptive vs Inferential
- Types of data: Qualitative (Nominal, Ordinal) vs Quantitative (Discrete, Continuous)
- Scales of measurement: Nominal, Ordinal, Interval, Ratio
- Organizing data: Frequency distributions, Tables and Graphs
- Types of graphs: Histograms, Pie charts, Bar graphs, Line graphs, Frequency polygons
- Percentile and Percentile Ranks

UNIT II: Measures of Central Tendency and Dispersion

8 Hours

In this unit students will understand the concept of central tendency and dispersion for different datasets

- Mean, Median, Mode: Properties, Application, appropriateness for data sets
- Range, Interquartile Range, Variance, Standard deviation
- Coefficient of variation
- Interpretation of variability in data

UNIT III: Probability Theory and Basics of Hypothesis Testing

8 Hours

In this unit the students will understand the fundamentals of probability and the structure of hypothesis testing. They will be able to state hypotheses and interpret the results of hypothesis tests.

- Introduction to Probability
- Null and Alternative Hypothesis
- Type I and Type II Errors
- One-tailed vs Two-tailed tests
- Significance level (α) and confidence intervals

UNIT IV: Hypothesis Testing using Statistical Tests

16 Hours

In this unit students will perform hypothesis tests for population means and proportions using appropriate tests.

- Concept of parametric and non-parametric tests
- Z-test for single means
- One-sample and two-sample t-tests for means
- One-way ANOVA
- Correlation and Regression
- Chi-square test
- Non-Parametric tests- Spearman's correlation, Sign test and Mann Whitney test
- Application of statistical procedures in Home Science -Tests and procedures suitable for research in the areas of Home Science
- Introduction to use of computers for statistical analysis - Excel, SPSS, AtlasTi

PRACTICAL (Credit 1; Hours 30)

1. Introduction to Statistical Software

2 Hours

- To familiarize students with tools like Excel for statistical analysis.
- Activity: Input basic data and perform basic excel functions on it.

2. Construction of Frequency Distributions

4 Hours

- Organisation of raw data into frequency tables.
- Activity: Use a given dataset to create grouped and ungrouped frequency tables.

- 3. Diagrammatic Representation of Data** **6 Hours**
- To visualize data using bar charts, pie charts, line graphs, histograms and frequency polygons.
 - Activity: Plot diagrams for a dataset and interpret the results.
- 4. Measures of Central Tendency** **4 Hours**
- Calculation of mean, median, and mode for grouped and ungrouped data using Excel.
 - Activity: Compare central tendencies of two datasets.
- 5. Measures of Dispersion** **4 Hours**
- Computation of range, variance, and standard deviation using Excel.
 - Activity: Analyze the spread of two different datasets.
- 6. Area under the curve** **2 Hours**
- Calculation of the area under the curve using standard scores.
- 7. Correlation Analysis** **2 Hours**
- Measurement of the strength of relationships between two variables.
 - Activity: Calculate Pearson's and Spearman's correlation coefficients.
- 8. Hypothesis Testing (One-sample and two sample t-test)** **2 Hours**
- To perform a one-sample and two sample t-test and test the significance.
 - Activity: Test a hypothesis about the mean of a single dataset, independent and dependent groups.
- 9. Chi-Square Test for Independence** **2 Hours**
- To test the independence between categorical variables.
 - Activity: Analyze a contingency table and interpret the test result.
- 10. Interpretation and Presentation of results** **2 Hours**
- Compilation of results from statistical analysis into a report/file including visualizations and interpretations.

Essential Readings

- Minium, E. W., King, B. M., (2003). Statistical Reasoning for Psychology and Education. 4th Edition, John Wiley and Sons, New York
- Rastogi Veer Bala, (2009). Fundamentals of Biostatistics, 2nd Edition. Ane Books Pvt. Ltd. New Delhi
- Gupta, S.P. (2021) Statistical Methods, 46th Edition. Sultan Chand and Sons. New Delhi.
- 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 Edition., Sultan Chand and Sons. New Delhi.
- Ross, Sheldon M. (2010). Introductory Statistics, 3rd Edition, Academic Press.

- Derek Rowntree, (2018). Statistics Without Tears- An Introduction for Non-Mathematicians, Penguin, UK.

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