24MA112 ESSENTIAL STATISTICS FOR COMPUTER SCIENCE

Category: **Core – Multi Disciplinary Course – I** **2L 0T 2P 3P**

Pre-requisite**: 10+2 Mathematics**

Course Description:

Descriptive Statistics equips you with the skills to confidently analyse real-world data and learn to calculate and interpret key descriptive statistics (mean, median, standard deviation) and create insightful data visualizations (histograms, boxplots) using Excel. By the end, you will be able to effectively describe data sets, make informed decisions based on statistical summaries, and communicate findings clearly. Descriptive statistics provides a strong foundation for students with no prior statistics experience. Whether you are pursuing a career in statistics, business, or any field that relies on data, this course will empower you to unlock the power of data analysis.

Course Aims and Objectives:

1. introduce the basic concepts and terminology used in descriptive statistics.
2. teach students how to represent data visually using graphs and charts such as histograms, box plots, and scatter plots.
3. teach students how to compute and interpret the mean, median, and mode.
4. explain and compute the range, interquartile range, variance, and standard deviation. introduce the concepts of skewness and kurtosis and their implications for data distribution.
5. explain the concept of correlation and how to calculate the Pearson and Spearman correlation coefficients and introduce simple linear regression analysis and teach students how to interpret regression coefficients and the goodness of fit.

Course Outcomes

At the end of the course, the student will be able to

CO1. interpret the calculated statistics to summarize the key characteristics of the data distribution (center and spread). (K5)

CO2. calculate and interpret skewness and kurtosis to identify the shape (symmetrical, skewed, etc.) of a data distribution. (K4)

CO3. interpret the visualizations to draw meaningful conclusions about the data. (K5)

CO4. assess the strength and direction of relationships between two variables using correlation coefficients. (K5)

CO5. use the regression model to make predictions about the value of one variable based on the other, understanding the limitations of such predictions.(K3)

Course Structure:

Unit – 1 Introduction to Statistics and Data Collection (6 Hrs + 6 Hrs)

Statistical Description of Data: Origin, history, and definitions of Statistics. Importance, scope, and limitations of Statistics. Functions of Statistics: Collection, Presentation, Analysis, and Interpretation. Collection of data: primary and secondary data and its methods. Classification of data: Quantitative, Qualitative, Temporal, Spatial. Presentation of data: Textual, Tabular – essential parts.

Unit II: Measurement Scales , Diagrams and Charts(6 Hrs + 6 Hrs)

Measurement Scales: Nominal, Ordinal, Ratio, and Interval. Frequency distribution and types of frequency distributions, forming a frequency distribution. Diagrammatic representation of data: Histogram, Bar, Multiple Bar, and Pie charts with simple problems. Graphical representation of data: Histogram, Frequency Polygon, and Ogives with simple problems.

Unit – III Measures of Central Tendency (MCT) (6 Hrs + 6 Hrs)

Measures of Central Tendency (MCT) Arithmetic Mean – properties, methods. Median, Mode, Geometric Mean (GM), Harmonic Mean (HM). Calculation of mean, median, mode, GM and HM for grouped and ungrouped data. Median and Mode through graph. Empirical relation between mean, median and mode.

Unit – IV Measures of Dispersion (6 Hrs + 6 Hrs)

Measures of Dispersion Concept and problems – Range, quartile deviation, mean deviation and standard deviation and variance. Central and non–central moments and their interrelationship. Sheppard's correction for moments. Skewness and Kurtosis- meaning and properties.

Unit – V Correlation and Regression (6 Hrs + 6 Hrs)

Correlation- Introduction, Meaning of Correlation, Scatter Diagrams, Karl Pearson Coefficient of Correlation. Rank Correlation-Spearman's rank correlation coefficient. Linear Regression- Regression coefficients and their properties and applications.

Text Books:

1. S. C. Gupta (2023) . Fundamentals of Statistics, Himalaya Publications. New Delhi.

References:

1. Gupta S.P. (2014). Statistical Methods, Sultan Chand & Sons Pvt. Ltd. New Delhi.
2. Levin Richard, L., David Rubin, S., et.al. (2017). Statistics for Management, 8th Edition, Pearson Education.

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