



**DISCIPLINE SPECIFIC MINOR COURSE IN STATISTICS: DSM-101  
(Basic Statistics and Probability)  
(Credits: 03)**

**Contact Hours: 45 Hours**

**Full Marks=100 [End Semester Exam (70) +Internal (30)]**

**Pass Marks =40 [End Semester Exam (28) +Internal(12)]**

**Learning objectives**

- To develop skills in graphical representation of data.
- To understand measures of central tendency, dispersion, and combined mean and variance to analyze data.
- To understand moments, skewness, and kurtosis to assess the characteristics of data.
- To gain proficiency in fitting curves including polynomials and exponential curves to data.
- To understand correlation coefficients including Karl Pearson's correlation coefficient and Spearman rank correlation coefficient.

**Learning outcomes**

- Interpret various types of graphs used for data visualization.
- Interpret measures of central tendency, dispersion, and combined mean and variance to summarize and analyze data.
- Analyze the distributional properties of data using moments, skewness, and kurtosis.
- Interpret the results of fitted curves, such as polynomials and exponential curves to a data set.
- Interpret Karl Pearson's correlation coefficient and Spearman rank correlation coefficient to assess the strength and nature of relationships between variables.

**UNIT I**

Definition, scope and limitations of Statistics, concepts of statistical population and sample, quantitative and qualitative data, nominal, ordinal and time-series data, discrete and continuous data. Presentation of data by tables and diagrams, frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency curves (inclusive and exclusive method).

**UNIT II**

Measures of central tendency: arithmetic mean, median, mode, geometric mean, harmonic mean, partition values. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, variance. Coefficient of dispersion: coefficient of variation. Moments: raw and central moments. Measures of skewness and kurtosis.

**UNIT III**

Bivariate data: scatter diagram, Karl Pearson's coefficient of correlation. Spearman's

rank correlation coefficient (Introductory with interpretation). Regression: lines of regression, properties of regression coefficients, angle between two regression lines. Principle of least-squares and fitting of linear equations, polynomials and exponential curves. Coefficient of determination.

#### UNIT IV

Random experiment, sample point and sample space, event, algebra of events. Definition of probability: classical, relative frequency and axiomatic approaches to probability, merits and demerits of these approaches (only general ideas to be given).

#### UNIT V

Addition and multiplication theorems of probability, theorem of total probability, conditional probability. Examples based on laws of addition, multiplication and conditional probability. Independent events: pairwise and mutual independence. Bayes' theorem and its applications.

### **SUGGESTED READINGS**

1. Freund, J. E. (2009). *Mathematical Statistics with Applications (7thEd.)*. Pearson Education.
2. Goon, A.M., Gupta, M.K., & Dasgupta, B. (2005). *Fundamentals of Statistics, Vol.I (8th Ed.)*. World Press, Kolkata.
3. Gupta, S.C., & Kapoor, V.K. (2007). *Fundamentals of Mathematical Statistics (11th Ed.)*. Sultan Chand and Sons.
4. Hogg, R.V., Craig, A.T., & McKean, J. W. (2005). *Introduction to Mathematical Statistics (6th Ed.)*. Pearson Education.
5. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007). *Introduction to the Theory of Statistics (3rd Ed.)*. Tata McGraw Hill Publication.