Course Code	Course Name	Credits
26ZY512	BIOSTATISTICS	04

Course Objectives

- To understand the fundamental concepts and principles of biostatistics.
- To explain statistical methods used in biological and health sciences research.
- To develop knowledge on data collection, classification, tabulation, and analysis.
- To analyze biological data using appropriate statistical tools and techniques.
- To enhance problem-solving and analytical skills in interpreting scientific data.

Learning Outcomes

- Explain the basic concepts and applications of biostatistics in biological research.
- Differentiate various methods of data collection, organization, and presentation.
- Examine statistical measures such as mean, median, mode, variance, and standard deviation.
- Analyze biological data using statistical tests and probability concepts.
- Apply biostatistical methods and analytical skills in research and scientific studies.

Unit 1 – Concepts in statistics (12 Hrs.)

Types of Data, presentation of data, types of graphics, relative frequency, cumulative frequency, Measurement of central tendency, Measures of variation, coefficient of variation, Measures of Skewness and Kurtosis, Probability and its applications.

Unit 2 – Representation of data and descriptive statistics (12 Hrs.)

Introduction to Biostatistics, classification of variables, types of data, data collection and sampling methods, data representation- diagrammatic methods (line diagram, bar diagram, pie chart), graphical methods (Histogram, frequency polygon, frequency curve, ogive). Measure of central tendency- mean, median, mode, quartiles, harmonic mean and geometric mean. Measure of dispersion- mean deviation, quartile deviation, standard deviation and coefficient of variation.

Unit 3 - Bivariate analysis and probability distribution (12 Hrs.)

Correlation- types, reasons and methods of estimating correlation Spearman's Rank correlation coefficient. and Karl Pearson's coefficient of correlation. Linear Regression analysis, Curve fitting. Probability distribution-Binominal distribution, Poisson distribution.

Unit 4 – Design and analysis of experiments (12 Hrs.)

Random Variables and Distributions. Binomial, Poisson, Exponential and Normal Distributions and their applications. Samples and Sampling Distribution, Standard Error, significance level, Degrees of freedom, Tests of significance, tests for proportion, t and F tests Confidence Intervals.

Unit 5 - Inferential statistics for clinical researchers (12 Hrs.)

Contingency tables of X^2 (Chi square) tests of goodness of fit and homogeneity. Correlation: Simple, Partial and Multiple Correlation, Methods of averages and least squares, polynomial fitting, Regression Analysis. Analysis of variance for one way and two way classification. Design of experiments, randomization, replication local control, completely randomized and randomized block design.

Reference Books:

1. Fundamentals of Biostatistics Paperback – 1 December 2009 by V.B. Rastogi (Author).
2. Glover. T. and Mitchell, K. (2015) Introduction to Biostatistics. McGraw –Hill Science.
3. Zar. J.H. (2010) Biostatistical Analysis, Pearson Education, New Jersey.
4. Matthews, J.R. and Matthews, R.W. (2007) Successful Scientific writing: A step-by- step Guide for Biomedical Scientists, Cambridge University Press, Cambridge.
5. Snedecor, G. W. and Cochran, W. G. (1989). Statistical methods. Iowa State Press, Iowa.

Websites and eLearning Sources:

https://open.oregonstate.education/biostatistics/
https://www.biologydiscussion.com/biostatistics
https://www.easybiologyclass.com/category/biostatistics/