**Subject Code : P8BI7**

## CC – VII - MATHEMATICS FOR BIOINFORMATICS

UNIT – I

Nature of biological and clinical experiments – collection of experimental data - Measures of central tendency of a set of observations - Purpose of statistical investigations - arithmetic mean - mean of grouped data - median – mode - range, mean deviation, variants and standard deviation.

UNIT – II

Correlation and Regression - Scatter diagram – Karl Pearson's Coefficient of Correlation - Correlation Coefficient for a bivariate frequency distribution - Rank correlation - Linear regression - Principles of least squares – Student's 't' test for mean, difference of means – paired 't' test for difference of means – test for correlation and regression coefficients – Chi-square test for goodness of fit and independence of attributes - Simple problems based on biochemical data.

UNIT – III

Basic concepts of Probability - Sample space and events - The use of counting methods in probability - Addition law - Conditional probability - Simple problems involving the estimation of probabilities - Normal Distribution and Binomial and Poisson distributions – Z-score, P-value and E-value – Hidden Markov models – Neural networks – applications in bioinformatics - Needleman and Wunsch algorithm, Smith-Waterman algorithm

UNIT – IV

Matrices: Matrix algebra – Types of matrices – determinant – inverse, rank of matrix – solution of simultaneous equations – rotation matrices and co-ordinate transformation Vectors: Vector algebra - addition and subtraction of vectors – product of vectors, dot & cross products - scalar triple product – vector calculus – gradient, divergence, curl of a vector & identities – applications.

UNIT – V

Basic differentiation of algebraic and trigonometric functions – Maxima and Minima - Integration of simple functions - Definite and non-definite integrals – Table of integrals – Numerical methods for differentiation and integration – applications to systems biology

**Reference Books**


1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11th Edition, Sultan Chand & Sons, New Delhi, 2002.
2. D.W. Jordan and P. Smith, Mathematical Techniques, 3rd Edn, Oxford University Press, New Delhi, 2002.
3. L. Forthofer, Introduction to Biostatistics, Academic Press, 1995.
4. Robert R. Sokal and F.J. Rohlf, Introduction to Biostatistics (Biology-Statistics Series), W.H. Freeman & Company, New York, 1987.
5. E. Batschelet, Introduction to Mathematics for Life Scientists, 2nd Edn., Springer International Student Edn., Narosa Publishing House, New Delhi, 1991.