Subject Code : P8MB14

Core Course XIV (CC) – Biostatistics and Bioinformatics

Unit I: Biology in the computer age

Computational Approaches to Biological questions. Basics of computers – servers, workstations, operating systems, Unix, Linux. World Wide Web. Search engines, finding scientific articles - Pubmed – public biological databases.

Unit II: Genomics

Sequence analysis – Sequencing genomes – sequence assembly – pairwise sequence comparison - geneome on the web – annotating and analysing genome sequences. Genbank – sequence queries against biological databases – BLAST and FASTA– multifunctional tools for sequence analysis. Multiple sequence alignments, Phylogenetic alignment – profiles and motifs.

Unit III: Proteomics

Protein Data Bank, Swiss-prot - biochemical pathway databases -Predicting Protein structure and function from sequence – Determination of structure – feature detection – secondary structure prediction – predicting 3 D structure - protein modeling.

Unit IV: Biostatistics I

Introduction – Population and sample – Variables – Collection and presentation of data – Descriptive statistics - Measures of Central tendency – mean (arithmetic, harmonic & geometric) median and mode – Measures of dispersion – range, mean deviation, variance & standard deviation, Skewness and Kurtosis.

Unit V: Biostatistics II

Inferential statistics – Probability and distributions – Poisson, Binomial and Normal distribution – Chi-square test – Hypothesis test - Student's t-test – Correlation and Regression – ANOVA.

References:

W.J. Ewens, Gregory Grant,(2005). Statistical Methods in Bioinformatics: An Introduction (Statistics for Biology & Health), Springer

Bryan Bergeron,(2003).Bioinformatics Computing First Indian Edition, Prentice Hall,

Cynthia Gibas & Per Jambeck (2001). Developing Bioinformatics Computer Skills: Shroff Publishers & Distributors Pvt. Ltd (O'Reilly), Mumbai

HH Rashidi & LK Buehler (2002). Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London

Des Higgins & Willie Taylor (2002). Bioinformatics: Sequence, structure and databanks, Oxford University Press

Baxevanis AD & Ouellette BEF (2001) Bioinformatics: A practical guide to the analysis of genes and proteins, Wiley Interscience – New York

Arora PN & Malhon PK (1996). Biostatistics Imalaya Publishing House, Mumbai.

Sokal & Rohif (1973). Introduction to Biostatistics, Toppan Co. Japan.

Stanton A & Clantz, Primer of Biostatistics (2005). The McGraw Hill Inc., New York.