

Course III: Bioinformatics, Biostatistics and Computer Application) (MSCZO-603)

Block I: Bioinformatics

Unit 1: Biological Databases

- 1.1 Objectives
- 1.2 Introduction
- 1.3 Scope and applications of bioinformatics
- 1.4 Primary, secondary and composite databases
 - 1.4.1 Nucleotide sequence databases
 - 1.4.2 Protein sequence databases
 - 1.4.3 Gene Expression Database and Structural databases
- 1.5 Summary
- 1.6 Terminal Questions and Answers

Unit 2: Database and search tool

- 2.1 Objectives
- 2.2 Introduction
- 2.3 Computational tools and biological databases
 - 2.3.1 National Centre for Biotechnology Information (NCBI)
 - 2.3.2 European Bioinformatics Institute (EBI)
 - 2.3.3 EMBL Nucleotide Sequence Database
 - 2.3.4 DNA Data Bank of Japan (DDBJ)
 - 2.3.5 Swiss-Prot
- 2.4 Summary
- 2.5 Terminal Questions and Answers

Unit 3: Sequence alignment and database searching

- 3.1 Objectives
- 3.2 Introduction
- 3.3 The evolutionary basis of sequence alignment
- 3.4 Database similarity searching
 - 3.4.1 Sequence Similarity search tools: BLAST and FASTA
- 3.5 Concept of Alignment
 - 3.5.1 Multiple Sequence Alignment (MSA)
 - 3.5.3 Percent Accepted Mutation (PAM)
 - 3.5.4 Blocks of Amino Acid and Substitution Matrix (BLOSUM)
- 3.6 Summary
- 3.7 Terminal Questions and Answers

Unit 4: Computational Tools for DNA Sequence Analysis

- 4.1 Objectives
- 4.2 Introduction
- 4.3 Database submission
- 4.4 Data retrieval
- 4.5 Relationship between sequence and biological functions
- 4.6 Molecular Phylogeny
- 4.8 Consistency of Molecular Phylogenetic Prediction
- 4.9 Application of bioinformatics
- 4.10 Summary
- 4.11 Terminal Questions and Answers

Block II: Biostatistics

Unit 5: Introduction to Biostatistics

- 5.1 Objectives
- 5.2 Introduction
- 5.3 Statistical symbols
- 5.4 Scope & Applications of biostatistics
- 5.5 Collection, organization and representation of data
- 5.6 Importance of statistics in biological research
- 5.7 Summary
- 5.8 Terminal Questions and Answers

Unit 6: Measures of central tendency and variability

- 6.1 Objectives
- 6.2 Introduction
- 6.3 Mean, Mode & Median
- 6.4 Mean deviation
- 6.5 Standard deviation & Standard error
- 6.6 Variance and coefficient of variation
- 6.7 Chi –Square test
- 6.8 Student T - test
- 6.9 Summary
- 6.10 Terminal Questions and Answers

Unit7: Correlation and Regression

- 7.1 Objectives
- 7.2 Introduction
- 7.3 Types of correlation
 - 7.3.1 Simple correlation and linear regression
 - 7.3.2 Methods of studying correlation
- 7.4 Regression analysis
 - 7.4.1 Uses of regression analysis
- 7.5 Summary
- 7.6 Terminal questions and Answers