MINOR COURSE

BIM222N BIOINFORMATICS FOUNDATIONS IN BIOINFORMATICS

CREDITS: THEORY: 04; PRACTICALS: 02

THEORY (4 CREDITS)

Unit-I: DNA damage and repair

DNA damage and repair: Types of Mutations (Base substitution, Missense Mutation, Nonsense Mutation, Polypeptide Chain Termination, Deletion Mutations, Insertion Mutations, Frameshift Mutations, Silent Mutations) Chemical and physical Mutagens. Mispairing and Recombination, inherent Chemical Instability, Hot Spots, Reversions. Overview of Recombination, Molecular Basis of Homologous Recombination, Recombination in Higher organisms, DNA Repair: DNA Mismatch Repair System, General Excision Repair System, Repair by Excision of Specific Bases, Specialized DNA Repair Mechanisms, Photoreativation, Repair by Recombination, SOS Error Prone Repair in Bacteria, Repair in Eukaryotes, Double Strand Repair in Eukaryotes, Gene Conversion.

Unit-II: Gene1c analysis

Gene Analysis Methods: genomic Libraries, DNA Library construction, Screening Library by DNA Hybridization, Preparation of probes, Nucleic Acid staining, Radioactive and Non- Radioactive labeling, Restriction Enzyme Mapping sub-cloning, In vitro Mutagenesis of Cloned DNA sequences, Deletion Mutagenesis, Oligonucleotide-Directed Mutagenesis, Characterization of Genome organization: E coli K-12 Genome, Yeast *(Saccharomyces cerevisiae),* Human Genome.

Unit-III: Computers and Navigation

Computer basics (MS DOS, MS WORD, MS EXCEL, MS POWER POINT), Bioinformatics and Internet basics, Content Providers and ISPs and Electronic mail (Bulk mail and E-mail servers), File Transfer Protocol, World Wide Web (WWW), Navigation on the WWW, Introduction to different Browsers, Internet and Intranet, Applications of computers in Bioinformatics Research.

Unit-IV: Introduc1on to Bioinformatics

Introduction to Biostatistics: Concept of sample and population. Different sampling strategies and types. Mean, Mode Median, Variance, Standard deviation, coefficient of variance. Graphical representation of Data: Bar Charts, histograms, frequency distributions, pie charts, dendrograms etc.

PRAC1CALS (2 CREDITS):-

1. Demonstration of PCR.
2. Agarose gel electrophoresis of DNA.
3. Hands on training for using Microsoft-Word, Excel & PowerPoint.
4. Hands on training for calculation of mean, mode, median & SD using excel.

Books Recommended:

1. Genetics. A Conceptual Approach: Benjamin A Pierce
2. Applied Molecular Genetics: Roger I. Miesfeld
3. Basic Biostatistics- Sunder Rao