

**1<sup>st</sup> SEMESTER**  
**MAJOR COURSE**  
**BIM122J BIOINFORMATICS \_ BASIS FOR BIOINFORMATICS-I**

**THEORY (4 CREDITS)**

**UNIT-1: INTRODUCTION TO GENETICS**

Introduction to genetics and its importance: Mendelian genetics, Population genetics and its applications. Gene concept, alleles, transposable elements. Genetic linkage and mapping, brief idea of genetic disorders.

**UNIT-2: DNA/RNA ITS TYPES AND FUNCTIONS**

DNA: Nucleotides and nucleosides. DNA Structure, non-coding and coding DNA, repeated sequences, satellite DNA, tandem repeats, VNTRs, junk DNA, palindromes, inverted repeats. Conformations (A, B, C and Z). Super-coiling of DNA (Linking No., Twisting, Contour length) RNA, and its types and functions. tRNA Structure and function. DNA replication, transcription, post transcriptional modifications, translation.

**UNIT-3: AMINO-ACIDS TO PROTEINS**

Amino acids, structure, classification and properties. Levels of protein structure, importance and determination of primary structure. Secondary structure (Alpha helix, Beta sheet and beta turns). Characteristics of peptide bond (W and <t> bonds). Super secondary structures, protein domains. Tertiary structure of proteins. Quaternary structure of proteins. •

**UNIT-4: NUCLEOTIDE SYNTHESIS AND TECHNIQUES**

Chemical and enzymatic synthesis of DNA and RNA. Purification of Nucleic acids. Gel electrophoresis, Blotting techniques and hybridisation, DNA finger printing, foot printing, PCR and Chromosome walking. DNA sequencing.

**PRACTICALS (2 CREDITS):-**

1. Karyotype Analysis (mitotic and meiotic)
2. Isolation of DNA from Bacterial cells.
3. Isolation of DNA from Plant cells.
4. Isolation of DNA from Blood.

**BOOKS RECOMMENDED:**

1. Genetics. A Conceptual Approach: Benjamin A Pierce
2. Instant Notes in Molecular Biology: Phil turner et al.
3. Applied Molecular Genetics: Roger I. Miesfeld
4. Molecular biology: David P Clark.