V SEMESTER   **BIOCHEMISTRY**   TIME:4HRS/WEEK
BCH-E3-5804 (3)   **BIOINFORMATICS**   MAX.MARKS:100
w.e.f. 2020-2021 (20AH)

Course Objectives- To enable the students to-
- **Imbibe basics of Bioinformatics and computer aided drug design**
- **Understand various Biological databases**
- **Search sequence similarities between Nucleic acid sequences**
- **Imbibe knowledge Human Genome project and it uses**
- **Get introduction to basics of Proteomics**

Course Outcomes: Students will be able to-
CO1: Analyse gene annotation and analysis tools in bioinformatics
CO2: Search Biological databases and retrieve data
CO3: Perform sequence alignments and identify similarities between nucleic acid sequences
CO4: Illustrate benefits of Human genome project in various fields
CO5: Perform 2D-PAGE data base and illustrate concepts of proteomics

UNIT- I Scope of Bioinformatics   12Hours
Genomics, structural and functional genomics, genome annotations, gene prediction approaches and tools. DNA microarray and computational analysis tools. Computer aided drug design and systems biology.

UNIT- II Biological data bases   12 Hours
Introduction to biological databases. Primary, secondary and composite databases, NCBI, EBI, Nucleic acid databases (Gene Bank), EMBL, DDBJ, NDB) protein database, (PIR, Swissport, TrEMDL, PDB) Metabolic databases (KEGG, EcoCyc).

UNIT -III Sequence Alignments   12 Hours
Similarity, identities and homology. Concept of alignment pairwise sequence alignment, gaps, gap-penalties, scoring matrices, PAM 250, BLOSUM62, Local and Global Sequence alignment, multiple sequence alignment, progressive alignment, Logarithm alignment. Application of multiple sequence alignment- CLUSTAL W, BLAST-blastn, blastp and blastx

UNIT- IV Genome projects   12 Hours
General introduction to genome projects (rice and Mycobacterium tuberculosis genome project). Special emphasis on Human Genome Project (HGP). Science behind HGP, benefits of HGP, genetic testing standard, quality and commercialization.

UNIT- V Proteomics   12 Hours
Introduction, principle, technique of swiss- 2D PAGE data base. Gel analysis, post gel analysis, MALDITOF. Significance and applications of proteomics in modern biology.

Suggested books
1. Genome Mapping: A practical approach. Dear P (Editor). 1st Ed. 2000. Oxford University.
2. Developing Bioinformatics Skills. Alfonso Valencia and Blaschke. L (2005) Oreilles
3. Bioinformatics sequence, structure and data banks ed. By Des Higgins Willie Taylor (2006).

4. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins" (Andreas D. Baxevanis, B. F. Ouellette), Paperback, 2nd ed., 470 pp., ISBN: 0471383910, Publisher: Wiley, John & Sons, Inc.Pub.
5. David W. Mount, Bioinformatics: Sequence and Genome Analysis, 2nd edition, Cold Spring Harbor Laboratory, 2004.
6. Introduction to Bioinformatics by T.K. Altwood and D.J Parry-Smith (Pearson Education Asia1999).