B.Sc. Biotechnology: Semester-VI BST 602: Genomics and Proteomics	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	**Examination Scheme** Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Course Objectives:

1 To give extensive knowledge of structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes; Human genome project.

2. To give complete knowledge about expression profiling of gene, microarray and data analysis.

3. To analyze tools for genome analysis as well as give detailed information about hybridization based assays, Polymerization based assays, Ligation based assays.

4. To explain and give an outline of a typical proteomics experiment.

5. To explain tryptic digestion of protein, peptide fingerprinting and protein-protein interactions

Course Outcomes:

After completing the course, students will be able to:

CO1: To define Structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes; Human genome project.
CO2: To understand the mechanisms for Human disease genes; DNA polymorphism including those involved in diseases; Hemoglobin and the anemias; Phenylketonuria (monogenic) and diabetes (multigenic) genetic disorders; 'disease' gene vs. 'susceptibility' gene.
CO3: To determine Clinical aspect of expression profiling of gene, microarray and data analysis, difference in gene expression in nuclear, mitochondrial and chloroplast gene, taxonomic classification of organisms using molecular markers- 16S rRNA typing/sequencing.
CO4: To analyze Tools for genome analysis – PCR, RFLP, DNA fingerprinting, RAPD, automated DNA sequencing; Linkage and pedigree analysis; construction of genetic maps; physical maps, FISH to identify chromosome landmarks.
CO5: To explain and give an outline of a typical proteomics experiment; Identification and analysis of proteins by 2D analysis.
CO6: To explain tryptic digestion of protein and peptide fingerprinting. Protein-protein interactions, Yeast two hybrid system; Phage display; Protein interaction maps; Protein arrays-definition; Applications- diagnostics, expression profiling

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Detailed syllabus:

UNIT-1 Structure and organization of prokaryotic and eukaryotic genomes
Structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes; Human genome project-landmarks on chromosomes generated by various mapping methods; BAC libraries and shotgun libraries preparation; Physical maps – cytogenetic map, contig map, restriction map. Human disease genes; DNA polymorphism including those involved in diseases; Hemoglobin and the anemias; Phenylketonuria (monogenic) and diabetes (multigenic) genetic disorders; 'disease' gene vs. 'susceptibility' gene; SNP detection:
UNIT-2 Clinical aspect of expression profiling of gene
Clinical aspect of expression profiling of gene, microarray and data analysis, difference in gene expression in nuclear, mitochondrial and chloroplast gene, taxonomic classification of organisms using molecular markers- 16S rRNA typing/sequencing. Tools for genome analysis– PCR, RFLP, DNA fingerprinting, RAPD, automated DNA sequencing; Linkage and pedigree analysis, FISH
UNIT-3 Overview of protein
Overview of protein structure- primary, secondary, tertiary and quaternary structure; Relationship between protein structure and function; Outline of a typical proteomics experiment; Identification and analysis of proteins by 2D analysis; Spot visualization and picking; Tryptic digestion of protein and peptide fingerprinting. Protein-protein interactions. Yeast two hybrid system; Phage display; Protein interaction maps; Protein arrays-definition; Applications- diagnostics, expression profiling

Text and Reference Books

1. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley 2006
2. Brown TA, Genomes, 3rd Edition. Garland Science 2006
3. Campbell AM &Heyer LJ, Discovering Genomics, Proteomics and
4. Bioinformatics, 2nd Edition. Benjamin Cummings 2007
5. Primrose S &Twyman R, Principles of Gene Manipulation and Genomics, 7th Edition, Blackwell, 2006.

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