

SEMESTER-V

COURSE 14: GENOMICS & PROTEOMICS

Theory

Credits: 3

3 hrs/week

I. LEARNING OUTCOMES

On successful completion of the course, the students will be able to

1. Learn about mapping techniques
2. Learn about sequencing analysis
3. Learn about ORF and Gene location
4. Learn about proteomics
5. Learn about determination of proteins

II. Syllabus

UNIT I

1. Introduction of Genomics , Studying the Genome, DNA data bases.
2. Genetic Mapping-Markers for Genetic Mapping; RFLP, SSLP - VNTR's, STR's, SNP's;
3. Physical Mapping - In situ hybridization, Sequence Tagged Sites Mapping.

UNIT II

1. Determination of nucleotide sequence: Chemical degradation method, Sanger's di-deoxynucleotide synthetic method.
2. Direct DNA sequencing using PCR,
3. Sequencing by conventional shotgun method, Whole genome shot gun method, Clone contig method.

UNIT III

1. ORF scanning – Codon bias, Exon-Intron boundaries - Exon trapping, CpG island,
2. Gene location – Southern and Northern blotting hybridization, Zoo blotting.
3. Studying a transcriptome – Microarray or chip analysis, SAGE.

UNIT IV

1. Proteomics - ID-SDS-PAGE, 2D-PAGE.
2. Detection and quantitation of proteins in gels.
3. Protein staining techniques. Affinity purification of proteins.

UNIT V

1. Basics of Mass Spectroscopy- MALDI-TOF
2. ESI and their applications in proteomics.
3. Tandem MS/MS spectrometry , De novo sequencing using mass spectrometric data

III . Skills Outcome

On Successful Completion of this Course, Student shall be able to

1. Carry out protein structure prediction experiments.
2. Search and analyze genomic sequence databases using tools.
3. Carry out sterility testing of commercial pharmaceuticals.

SEMESTER-V

COURSE 14: GENOMICS & PROTEOMICS

Practical	Credits: 1	2 hrs/week
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1. Genome Viewers, SNP Analysis
2. Microarray Analysis
3. Protein Structure Prediction
4. Proteome Analysis
5. Network & Pathway Analysis
6. Calculation of phi and psi angles in proteins.
7. Structure validation and Protein Data Bank
8. Structural and functional motifs in proteins

V. REFERENCES

1. Discovering Genomics, Proteomics, & Bioinformatics (2003). Campbell & Heyer Pearson Education,
2. Bioinformatics, Methods of Biochemical Analysis (2001), Series Vol. 43, Baxevanis & Ouellette, John Wiley & Sons,
3. Computational Molecular Biology. Pevzner, P.A. (2000) MIT Press
4. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins(2004). Andreas D. Baxevanis & B. F. Francis Ouellette. 3rd Edition. Wiley & Sons,

VI. CO-Curricular Activities

a) Suggested Co-Curricular Activities

1. Assignments
2. Seminars, Group Discussions on related topics
3. Charts on molecular markers