PBT5D001 HONORS: GENOMICS, PROTEOMICS AND METABOLOMICS

Module-I:

Introduction to genomics: Orientation and structure of genomes, subdividing the genome, assembling a physical map of a genome. Sequencing methods and strategies, genome annotation and information from web, bioinformatics

Genome sequencing projects- Microbes, plants and animals; Accessing and retrieving genome project Reverse genetics, Structural genomics, Functional genomics and Comparative genomics; High throughput screening in genome for drug discovery-identification of gene targets, Pharmaco-genomics and drug development.

Module-II:

Mapping protein interaction and applications: Global expression profiling, comprehensive mutant libraries, mapping protein interactions, applications of genome analysis and genomes. Introduction and tools of proteomics: Proteomics and Proteomes, Various tools used in proteomics (N-terminal sequencing of proteins, 2-D electrophoresis Differential display proteomics, Yeast two hybrid and three hybrid system, phage display, isoelectrofocusing, Peptide fingerprinting. LC/MS-MS for identification of proteins and modified proteins, SAGE, Protein micro array). Applications of proteomics: Mining proteomes, protein expression profiling, identifying protein – protein Interactions and protein complexes, mapping- protein identification, new directions in proteomics, structural proteomics; Proteomics and Drug delivery. Transcriptomics.

Module-III:

Metabolite isolation and analysis by Mass Spectrometry, Sample preparation (fractionation, enrichment, derivatization), metabolite library, Profiling based on NMR, LIF, LC-UV, 2-D and high (spatial) resolution metabolite profiling, **Quantitative metabolomics Metabolite analysis and biochemical pathways: Carbon pathway,** Secondary metabolism, amino acid metabolism, Engineered metabolism, Systems biology: Databases (Metabolic pathways resources) and pathway reconstruction.

Texts / References Book:

1. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley
2. Brown TA, Genomes, 3rd Edition. Garland Science
3. Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Benjamin Cummings
4. Glick BR & Pasternak JJ, Molecular Biotechnology, 3rd Edition, ASM Press
5. Pennington SR & Dunn MJ, Proteomics, Viva publications
6. H.D.Kumar, Molecular Biology, 2nd edition, Vikas Publishing House Pvt. Lt.
7. Singer, M, and Berg.P – Genes and genomes, Blackwell Scientific Publication,Oxford,1991.
8. Beebe.T, and Burke. T,Gene Structure and Transcription, 2nd edition, 1992, Oxford Univ Press.
9. Introduction to Proteomics by Daniel. C. Liebler, Humana press, 2002,198 pages.
10. Principles of gene manipulation and genomics by Primrose, S.B. and Twyman, R.M., Blackwell Publishing (2006)
11. Introduction to Genomics by Lesk AM, Oxford University Press (2008)
12. Proteomics: from protein sequence to function by Pennington, S.R. and Dunn, M. J., Viva Books (2001)