BHARATHIAR UNIVERSITY:COIMBATORE 641 046
M.Phil./Ph.D. LIFE SCIENCES (DIBER)
(For the candidates admitted from the academic year 2015-16 onwards)
PAPER-III
Genomics

UNIT I: ANALYSIS OF GENES AND GENOMES

Genomes of prokaryotes and eukaryotes, Methods of study- FISH, PCR, Sequencing, etc.

UNIT II: MOLECULAR MARKERS AND THEIR APPLICATIONS

DNA markers, Transcriptomic markers, Trait specific markers, Developing markers from sequencing/NGS data, Current relevance of molecular markers, Molecular breeding in plants, QTL mapping, Computational tools facilitating molecular marker identification and molecular breeding, TILLING

UNIT III: WHOLE GENOME SEQUENCING STRATEGIES

Genetic models, Classical methods of sequencing, 1st generation sequencers, NGS Technologies, Comparative genomics, Role of Sequence analysis and alignment strategies, Functional analysis, Pathway predictions, NCBI, KEGG, Systems biology, Epigenetics

UNIT IV: TRANSCRIPTOMICS

cDNA library analysis and ESTs, Suppressive subtraction Hybridization, Microarray, MPSS, SAGE, SuperSAGE, MACE, Deep sequencing, RNAseq, Transcriptional analysis based on sequencing of short signatures (TAGS), Exome sequencing, Gene ontology, Annotation, Bioinformatics for NGS

UNIT V: PROTEOMICS

Stage and age specific proteomic analysis, 2D gel electrophoresis, 3D modelling, Prot-scan, Swiss-Prot and other bioinformatic tools, resources and databases for proteomics analysis, MALDI-TOF, X-Ray crystallography, NMR Spectroscopy

Reference

1. Das HK (2004) A Textbook of Biotechnology. John Wiley & Sons.
2. Grandi G (2004) Genomics, Proteomics and Vaccines. Wiley Press.
3. Gupta PK (2004) Biotechnology and Genomics. Rastogi Publications.
4. Hartwell L, Hood L, Goldberg M, Reynolds A and Silver L (2010) Genetics: From Genes to Genomes. McGraw-Hill.
5. Kwon YM and Ricke SC (eds) (2011) High-Throughput Next Generation Sequencing: Methods and Applications (Methods in Molecular Biology). Humana Press.
6. Morot-Gaundry JF, Lea P and Briat JF (eds) (2004) Functional Plant Genomics. Science Publishers.
7. Razdan MK (2003) Introduction to Plant Tissue Culture. Oxford IBH Publishers.
8. Shui YQ (ed.) (2008) Bioinformatics- A Practical Approach. Chapman and Hall/CRC Press.
9. Slater A, Scott N and Fowler M (2003) Plant Biotechnology: The Genetic Manipulation of Plants. Oxford Press.
10. Weising K, Nybom H, Pfenninger M, Wolff K, Kahl G (2008) DNA Fingerprinting in Plants: Principles, Methods and Applications. II Ed. CRC Press.