

BTPE3001 FUNCTIONAL GENOMICS (3-0-0)

Module I: (08 Hours)

Introduction to genomics: Orientation and structure of genomes, subdividing the genome, assembling a physical map of a genome.

Module II: (06 Hours)

Sequencing methods and strategies, genome annotation and information from web, Genome sequencing Microbes, plants and animals; Accessing and retrieving genome project Reverse genetics, epigenetics, epigenetic landscape.

Module III: (10 Hours)

Genome editing approaches, Transcriptomics, Mapping protein interaction and applications: Global expression profiling, comprehensive mutant libraries, mapping protein interactions, applications of genome analysis and genomes.

Module IV: (08 Hours)

DNA Sequencing Techniques and applications Second generation Sequencing techniques – Pyrosequencing, Virtual Terminator Sequencing, Introduction to third generation Sequencing Techniques – Nanopore and Ion torrent, Applications - Personal Genomics, Metagenom.

Module V: (08 Hours)

Conceptualizing Functional Genomics, Transcriptomics and Proteomics Concepts of forward and reverse genetics; Transcript Sequencing vs. Hybridization; Functional Genomics using RNAi; High throughput transcriptomic techniques – Real Time analysis, Microarray, SAGE, RNASeq, ChIPSeq, The ENCODE project; High-throughput Cloning and applications; Biological Networks

Course outcomes (Cos)

- CO1: Understand the Concepts and Scope of Functional Genomics: Describe the goals and principles of functional genomics, including gene function analysis and genome-wide studies.
- CO2: Explore Gene Expression Techniques: Apply various tools and technologies such as microarrays, RNA-Seq, and qPCR to study gene expression patterns.
- CO3: Interpret Genome-wide Data: Analyze and interpret large-scale omics datasets using bioinformatics tools for functional annotation of genes.
- CO4: Integrate Genomics with Biological Pathways: Relate genomic data to cellular pathways, phenotypic traits, and biological functions across different organisms..
- CO5: Apply Functional Genomics in Research and Biotechnology: Utilize functional genomics approaches for applications in medicine, agriculture, and biotechnology, including disease gene discovery and crop improvement.

Books:

1. Genomics: Fundamental and application, Supratim Choudhury and David B Carlson
2. Introduction to genomics Arthur M. Lesk