Course Name: Systems Biology Lab

Course Number: BY523P

Credit: 0-0-2-1

Prerequisites: - M. Tech. Biotechnology Students who enrolled for Systems Biology specialisation

Students intended for: M. Tech. Biotechnology

Elective or Core: Elective Lab

Semester: Even/odd

Course objective: This course gives a hands-on training to the students on methods used routinely in Systems Biology Analysis.

Content of experiments:

Lab sessions for "**Introduction to "OMICS" and Systems Analysis**" course:
- Basic Insilico analysis of NGS data of genomes/Metagenomes
- Differential gene expression analysis of transciptome data
- 16S rRNA based phylogenetic profiling
- Introduction to Gene Ontology, KEGG, EcoCyc databases
- Automated pathway mapping and annotation of proteins
- Extraction of reaction and metabolite information
- Metabolic network reconstruction
- Genome scale model analysis
- Insilico Gene dispensability analysis

Lab sessions for "**Metagenomics, and Next Generation Sequencing Technologies**" course:
- Next Generation Sequencing application for Amplicon sequencing
- Next Generation Sequencing application for Transcriptome sequencing
- Next Generation Sequencing application for Metagenomic sequencing
- Basic Insilico analysis of NGS data of genomes/Metagenomes
- Differential gene expression analysis of transciptome data
- 16S rRNA based phylogenetic profiling

Lab sessions for "**Metabolic Systems Biology**" course:
- Metabolite profiling experiment – NMR/MS based
- Metabolomics experiment untargeted/targeted
- Statistical analysis of the metabolomics data generated
- Measuring major biomass components (for constraints) of a typical cell – I
- Measuring major biomass components (for constraints) of a typical cell – II
- Isotopomer measurements using Mass spectroscopy and their analysis
- 13C based/constraint based flux analysis of central metabolic network-I
- 13C based/constraint based flux analysis of central metabolic network-II
- Making sense of the generated flux map.

Lab sessions for "**Proteomics**" course:
- Proteomics experiments