BY606   Bioinformatics Applications for System Analysis

Credit: 2-0-2-3   Approval: Approved in 3rd senate

Prerequisite: Knowledge of pattern recognition and artificial intelligence

Students intended for: B. Tech. 3rd& 4th year

Elective or Core: Elective   Semester: Even

Course objective:

The course is aimed at providing a basic understanding to the students about bioinformatics methods and their in-depth applications for solving biological problems. The course will include practical sessions for the students to help them master some of the bioinformatics techniques from hands-on experience. The course will also involve a project development towards important biological problems within the purview of the course.

Course content:

- **Part I: Basic Bioinformatics**

- ***Introduction to Bioinformatics****: What is Bioinformatics? What are the applications of Bioinformatics?

- ***Introduction to Basic Biology****: Introduction to basic biological processes to which bioinformatics methods will be mainly applied in this course.

- ***Introduction to Basic Programming****: Introduction to basic scripting and programming routinely used for bioinformatics analysis.

- ***Sequence and Molecular File formats****: Introduction to different file formats used for biological data. Sequence and molecular file conversion tools.

- ***Databases in Bioinformatics****: Introduction to different biological databases, their classification schemes, and biological database retrieval systems.

- **Part II: Bio-algorithms and Tools**

- ***Sequence Alignments****: Introduction to concept of alignment, Scoring matrices, Alignment algorithms for pairs of sequences, Multiple sequence alignment.

- ***Gene Prediction Methods:*** What is gene prediction? Computational methods of gene prediction.

- ***Molecular Phylogeny:*** Introduction to phenotypic and molecular phylogeny. Representation of phylogeny, Molecular clocks, Methods of phylogenetic construction, statistical evaluation of the obtained phylogenetic trees.

- ***Pathways and Systems Biology****: Introduction to pathways and systems biology, Analysis of Pathways, Metabolic network properties, Metabolic control analysis, Simulation of cellular activities.

  Text Book:

  S.C. Rastogi, N. Mendiratta, P. Rastogi, Bioinformatics: Methods and Applications Gennomics, Proteomics, and Drug Discovery (3rd Edition) PHI Learning Private Limited New Delhi (2011)
  Z. Ghosh and B. Mallick, Bioinformatics Principles and Applications, Oxford University Press.

Other References:*Arthur M. Lesk,* Introduction to Bioiformatics, (3rd Edition) Oxford University Press.