

IT-AD06 ADD-ON DIPLOMA IN COMPUTATIONAL METHODS IN BIOINFORMATICS

Objective: To provide basics about the computational problems in the emerging areas Bioinformatics, Computational Biology, and Genomics to the students having varied backgrounds of engineering, computer science, and the life sciences. The course is aimed at training these students in computational to work in the area of bioinformatics and computational biology.

Eligibility: 10+2 or Higher and regular students of Life Sciences, Biotechnology with working knowledge of computers

Reservation: SC/ST/OBC as per university rules.

Duration: One Year part time, 80 hrs of teaching

Fee: Regular students from Constituent colleges: Rs 2000/- for Students of courses where add-on courses are compulsory, Rs 2500/- for others. Students from other institutions: Rs 3000/-

Seats: Thirty. The course will be offered only against admission of a minimum of 15 candidates

Examination: Examination will be conducted by a board consisting of an internal examiner and an external examiner on the basis of a MCQ on-line /off-line test of 1 hr duration (50 questions, 100 marks) and practical test of 3hrs (100 Marks). Total marks of the examination will be 200. Rs 200/- per candidate will be collected by the computer center

towards the MCQ based OMR/Online test in addition to the university examination fee.

In order to be eligible for the Diploma, candidate is required to score 50% of the total marks. Those who fail to get 50% marks will be required to reappear in the examination as and when conducted by the university. A Certificate will be awarded instead of Diploma to the candidates who are allowed to take this course independently, not as an Add-on course

SYLLABUS

COMPUTATIONAL METHODS IN BIOINFORMATICS

Computing Infrastructure: (Brief survey) Computer Architecture, Computer Networks, PC's, Desktops, Workstations, Parallel and Super computer, Operating System, Basics of Computer Software: Algorithms, Data Structures, programming Languages, Networks: Communication Models, Transmission Technology, Protocol, Bandwidth, Topology, hardware and Software for Networks, Network Security, Web Pages

Introduction to computational biology and bioinformatics

DATABASES: Definition, Data Management, Data Life Cycle, Database Technology, Interfaces, Implementation using MS Access

Search Engines : The Search Process, Search Engine Technology, Searching and Information theory, Search Algorithms and Approximate searches, Search engines and Knowledge Management

Data Visualization: Sequence Visualization-Sequence Maps, Structure Visualization: Visualization and Rendering tools, User Interface, Animation and Simulations, Software for Visualization and simulations

Biostatistics: Basics, Quantifying Randomness, Data Analysis, tool Selection, Statistics of alignment, Clustering and Classification

Data Mining: Methods: Slection and sampling, Preprocessing and Cleaning, Transformation and Reduction, Data Mining methods, Evaluation and Visualization, Desiging new queries, Overview of Data Mining Technologies, Pattern Recoginition and Discovery, Introductio0n to Machine Learning :Inductive Logic programming, Genetic algorithms,Neural networks, Statistical methods, Decuision Tress, Hidden Markov Models. Text mining: Natural Language Processing, Text summarization. Tools for Machine learning

Pattern Matching : Fundamentals: Pairwise Sequence Alignmnet,Local Versus Global Alignment, Multiple Sequence Alignment, Fot Matrix Analysis, Substitution Matrices, Dynamic Programming

Brief introduction to Bioinformatics Tools and databases for Molecular and Genome Analyses, Case studies: Any two tools (Each candidate will be required to select two tools for case study

Reference book

Bioinformatics computing, Bryan Bergeron, Pearson Education 2003