



BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
INSTRUCTION DIVISION
SECOND SEMESTER 2020-2021
Course Handout (Part II)

Date: 15/01/2021

In addition to part I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. : **BIO F242**
Course Title : **INTRODUCTION TO BIOINFORMATICS**
Instructor In charge : **SHIBASISH CHOWDHURY**
Instructor : Ashish Katyal

1. CROUSE DESCRIPTION:

Introduction to genomic & Proteomics, Biological databases and data mining, sequence similarity search and sequence alignment, Protein structure predication and structure analysis, use of software package in Bioinformatics.

2. SCOPES AND OBJECTIVE:

This course designed to impart the beginner wit the fundamentals, which would enable understanding of the intricacies and vast scope of Bioinformatics. A sampling of the different areas required for understanding of this upcoming field will be provided along with in silico exercises to familiarize individuals with different programme packages.

3. Text Books : A. “Introduction to Bioinformatics” By Arther M Lesk, Oxford, 2008 (TB-1)

B. “Bioinformatics: Principles and Applications”, By Zhumur Ghosh and
Bibekananda Mallick, Oxford University Press, 2008 (TB-2)

4. Reference Books: A. “Bioinformatics Genome and sequence Analysis” by David W Mount, CSHL Press, 2003 (RB-1)

B. “Essential Bioinformatics” by Jin Xiong, Cambridge University Press, 2013 (RB-2)

5. Course Plan

Lecture No.	Learning Objectives	Learning Outcomes	Reference Chap/Sec (Book)
1.	Introduction	What is Bioinformatics, Scope and application	Chap-1 (TB-1) Lecture





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			Notes
2-4	Overview of molecular biology and genetics related to bioinformatics	Nucleic acid Sequence & Structure, Protein Sequence & Structure, DNA replication, Transcription, Translation, Genetic code, Codon bias	Lecture Notes/Any basic text book of Molecular Biology
5-6	Programming languages relevant to Bioinformatics	Perl/Python/Shell Script	On line tool/E-book
7-12	General overview of different techniques to generate biomolecular information and analysis	DNA sequencing, Genome sequencing, Protein sequencing, PCR, NMR, X-ray crystallography, Micro array	Lecture Notes and relevant papers
13	Collection & storage of Data	Web resources in Bioinformatics Lab: Major information resources on the Web	Chap-4 (TB1)
14-15	Biological Database	Primary databases, Secondary databases Lab: NCBI and genome databases	Chap 4 (TB1)
16-31	Sequence Analysis and alignment	Definition of sequence alignment, Method of sequence analysis, Dotmatrix, dynamic programming algorithms for sequence alignment, use of scoring matrix and gap penalties, significance of sequence alignment, Multiple sequence alignment, statistical methods for aiding alignment, Markov models, Hidden Markov models, position-specific scoring matrices. Lab: Tools for genome data mining Lab: Blast and other alignment tools	Chap5 (TB1) Chap-3 and Chap 4 (RB-1) Chap-5 and Chap-6 (RB-2)





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32-35	Phylogenetic analysis	Tree building and evaluation methods	Chap5 (TB1)
36-37	Gene Prediction	Basics of gene prediction algorithms	Chap8 (RB-2)
38-41	Protein structure prediction	Homology modeling, <i>abinitio</i> structure prediction, Threading method	Chap 6 (TB1)

6. Evaluation Scheme:

Component	Duration	Weightage%	Date & Time	Remarks
Mid-Semester Test	90 Mins	25%	<TEST_1>	OB
Surprise Quizes, assignments	Throughout the semester distributed in class as well as in tutorial hour	25%		CB/OB
Project		15%		OB
Compre. Exam.	2 hrs.	35%	<TEST_C>	Partially CB

7. Chamber Consultation Hours: To be announced.

8. Notices: Notices, if any, concerning the course will be displayed on the Notice Board of Biological Sciences notice board.

9. Make up Policy: Make up will be given on genuine grounds as determined by the Instructor-in-charge.

Instructor In Charge
BIO F242



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