BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI,
HYDERABAD CAMPUS
FIRST SEMESTER 2020-2021
COURSE HANDOUT (PART II)

Date: 17/08/2020

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: DEBASHREE BANDYOPADHYAY (L), SYEDA LUBNA (T)

1. Scope and objective of the Course:
Introduction to genomic & Proteomics, Human Genome and other sequencing projects, Biological databases and data mining, sequence similarity search and sequence alignment, Protein structure predication and structure analysis, use of software package in Bioinformatics. This course designed to impart the beginner with 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 slilico* exercises to familiarize individuals with different program packages.

2. Text Book : "Introduction to Bioinformatics*"* Arthur M. *Lesk*; Oxford University Press (2009) (TB)

3. Reference Books:1."Instant Notes in MOLECULAR BIOLOGY" P.C. Turner, A.G. McLennan, A.D. Bates & M.R.H. White, Viva Books Private Ltd, New Delhi. (RB1)
2. "Bioinformatics Genome and sequence Analysis" by David W Mount, CSHL Press, 2003 (RB2)

4.Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Reference Chap./Sec. (Book)
1.	Introduction	What is Bioinformatics, Scope	Lecture Notes
2-6	Overview of molecular biology & genetics	Nucleic acid; Structure & function	Sec C- RB1
		Protein Structure & function	Sec B- RB1
		Central dogma of life – Replication/Transcription/Translation	Secs E/K/Q-RB1

		Genetic code, Codon bias	Sec P- RB1
7-13.	General overview of different techniques to generate biomolecular information and analysis	DNA sequencing, Genome sequencing, PCR, NMR, X-ray crystallography, Micro array, Perl	Class Notes
14.	Information Networks	WWW, TCP/IP, HTTP, URLs	Chap.2 TB
15-16	Collection and storage of sequences	Submission of sequences to the databank, Computer storage of sequences, Web resources in Bioinformatics	Chap-2,3,4,5 (TB)
17-18	Information Resources	Biological databases	Chap.4 TB
		Primary databases	Chap.3 TB
		Secondary databases	Chap.8 TB
19-33	Sequence Analysis and alignment	Definition of sequence alignment, Method of sequence analysis, Dot-matrix, 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.	Chap. 3 and Chap. 4 RB2
34-35	Phylogenetic analysis	Tree building and evaluation methods	Chap. 4 TB
36-38	Protein structure prediction	Homology modeling, *abinitio* structure prediction, Threading method	Chap. 5 TB/Class Notes
39- 41	Analysis Packages	Commercial databases and softwares,	Chap. 3 & 10 TB
42	Bioinformatics Programming	Introduction of different scripting language	Class notes

5. Evaluation scheme:

Components	Duration (minutes)	Date	Time	Weightage (%)	Nature of Component
Test 1	30	September 10 – September 20 (During scheduled class hour)		15	Open book
Test 2	30	October 09 – October 20 (During scheduled class hour)		15	Open Book
Test 3	30	November 10 – November 20 (During scheduled class hour)		15	Open book
Continuous evaluation (Quiz/assignments)	variable	Evenly spaced throughout the semester (To be completed by Nov 20)		25	Open book
Comprehensive examination	120	TBA		30	Open Book

6. Consultation Hour: To be announced in the class.

7. Notices: Notices will be displayed via CMS.

8. Make up Policy: Make up will be given on genuine grounds as determined by the IC.

9. Academic Honesty and Integrity Policy: Academic honesty and integrity is indispensable for the course. Any violation to that may attract strict penalty**.**

Instructor-in-charge
Bio F242