BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI,
HYDERABAD CAMPUS
SECOND SEMESTER 2019-2020
COURSE HANDOUT (PART II)

30-03-2020

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: Ramakrishna Vadrevu
Instructor : I. Shivakumar

1. Course Description:
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.

2. Scope and objective of the Course:
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 silico* exercises to familiarize individuals with different program packages.

3. Text Book : "Introduction to Bioinformatics*"* Arthur M. *Lesk*; Oxford University Press (2008, Third Edition) (TB)

4. 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."GENES VII " Benjamin Lewin. (RB2)
3. "Bioinformatics Genome and sequence Analysis" by David W Mount, CSHL Press, 2003 (RB3)

5.Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1.	Introduction	What is Bioinformatics, Scope	Lecture Notes
2-6	Overview of molecular biology & genetics	Nucleic acid; Structure & function	Sec C- RB1; Lecture Notes
		Protein Structure & function	Chap2 TB

		DNA replication	Sec E- RB1;
		Transcription	Sec K- RB1; Chap2, TB
		Translation	Sec Q- RB1; Chap2 TB
		Genetic code, Codon bias	Sec P- RB1
7-12.	General overview of different techniques to generate biomolecular information and analysis	DNA sequencing, Genome sequencing, PCR, NMR, X-ray crystallography, Micro array, Proteomics	Chap7 TB Lecture Notes
13.	Information Networks	WWW, TCP/IP, HTTP, URLs	Chap2 TB
14-16	Collection and storage of sequences	Submission of sequences to the databank, Computer storage of sequences, Web resources in Bioinformatics	Chap2,3,4b (TB)
17-19	Information Resources	Biological databases	Chap3/4 TB (Hands-on)
		Primary databases	Chap3 TB
		Secondary databases	Chap4 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.	Chap5 TB RB3
34-35	Phylogenetic analysis	Tree building and evaluation methods	Chap5 TB
36-38	Protein structure prediction	Homology modeling, *abinitio* structure prediction, Threading method	Chap. 6 TB/Class Notes
39- 41	Analysis Packages	Commercial software / Public Domain databases and software	Chap. 3 Hands-on
42	Bioinformatics Programming	Introduction of different scripting language	Class notes

6. Evaluation scheme:

Components	Duration	Date	Time	Weightage (%)	Nature of Component
Midsem	90 min			30%	Closed Book
Quiz (1) Assignments (3)	Diverse			25%	Assignments Open Book Quiz (Closed Book)
Comprehensive examination	3 Hours			45%	Closed Book

7. Chamber Consultation Hour: To be announced in the class.

8. Notices: **Notices, if any concerning the course will be displayed on the notice Board of Biology Dept.**

9. Make up Policy: Only in case of hospitalization for the exams. No Make up for class/take home assignments/announced quizzes. (all non-exam components).

10.Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
Bio F242