BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
INSTRUCTION DIVISION
SECOND SEMESTER 2015-2016
Course Handout (Part II)

Date: 12/01/2016

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 F215**
Course Title : **BIOPHYSICS**
Instructor-In-Charge : **SHIBASISH CHOWDHURY**
:Navin Singh

1. SCOPES AND OBJECTIVE:
The objective of the course is to introduce the students to the concepts of physical principles in the biological and biomimetic molecular systems. Properties and conformations of biomolecules like amino acids, proteins, nucleotides, nucleic acids as well as biomimetic systems like monolayers and bilayers are to be discussed. Related physical phenomena in these systems like structural transitions, protein folding, membrane equilibria are to be discussed. Emphasis will also be given to understand the principles of major experimental techniques applied to understand these physical problems.

2. Text Book (TB): "Introduction to Molecular Biophysics", J. A. Tuszynski and M. Kurzynski, Published by CRC Press (Indian Edition), Chennai

3. Reference Book (RF) : 1." Biophysical Chemistry, Part I, Part II and Part III", Charles R Cantor and Paul R. Schimmel, W.H. Freeman and Co., New York.
2. "Principal of Physical Biochemistry" Kensal E. van Holde, W. C. Johnson and P.S. Ho John, 2nd Edi. Pearson Prentice Hall

4. Course Plan

Lec. No.	Learning Objectives	Topics to be covered	Ref
	Self study	Basics of thermodynamics, bondings, interactions, basics of biomolecules, Biochemistry	Chapter-2 of RF-2, Text book of Physical Chemistry
1	Overall idea of the course	Overview of subjects	Chapter-1 of TB
2	Biological Macromolecules	Macromolecules, configuration and conformation, symmetry	Chapter-1 of RF-2
3-5		Weak interactions: Intermolecular interaction, H-bonding, hydrophobic interaction, Electrostatic interaction	Chapter-2 of TB, Chapter-1 of RF-2

6-9	Biological Macromolecules	Protein structure: Primary, Secondary, Tertiary and Quaternary structure of proteins	Chapter-2 of TB, Chapter-1 of RF-2, Chapter-2 of RF-1
10-12	Biological Macromolecules	The Structure of Nucleic acids	Chapter-2 of TB, Chapter-1 of RF-2, Chapter-3 of RF-1
13	Biological Macromolecules	Lipids and Membrane equilibria	Chapter-2 of TB, Chapter-25 of RF-1
14-17	Molecular Thermodynamics	Molecular mechanics, stabilizing interactions in Macromolecules	Chapter-3 of RF-2
18-19	Simulating macromolecule structures	Energy minimization, Molecular dynamics	Chapter-3 of RF-2
20-22	Physics of macromolecules	Conformation dependent properties of polymeric systems	Chapter-3 of TB, Chapter-4 of RF-2
23-24	Helix coil transitions in biomolecules	In proteins	Chapter-3 of TB, Chapter-4 of RF-2, Chapter-20 of RF-1
25-26		Protein folding	Chapter-3 of TB, Chapter-4 of RF-2, Chapter-21 of RF-1
27-28		In nucleic acids (DNA, RNA)	Chapter-3 of TB
29-30	Crystallographic techniques to determine the molecular structures	X-ray crystallography	Chapter 13 and 9 of RF-1 (Part-II), Chapter-6 of RF-2
31-32	Single Molecule Techniques	Optical & Magnetic tweezers	Chapter-16 of RF-2
33-34		Atomic force microscopy	Chapter-16 of RF-2
35-36	Magnetic Resonance method	Basic principle of NMR	Chapter-12 of RF-2
37	Spectroscopic techniques	Absorption spectro scopy	Chapter-9 of RF-2
38-39		Circular Dichroism (CD)	Chapter-10 of RF-2

40		Fluorescent Spectroscopy	Chapter-11 of RF-2

5. Evaluation Scheme:

Component	Duration	Weightage%	Date & Time	Remarks
Mid-Semester Test	90 Mins	30%	18/3 2:00 -3:30 PM	CB
Quizeses	Throughout the semester distributed in class as well as in tutorial hour	20%		CB/OB
Seminar, Assignments	Throughout the semester	15%		OB
Compre. Exam.	3 hrs.	35%	13/5 FN	Partially CB

6. Chamber Consultation Hours: To be announced.
7. Notices: Notices, if any, concerning the course will be displayed on the Notice Board of Biological Sciences notice board.
8. Make up Policy: Make up will be given on genuine grounds as determined by the Instructor-in-charge.

Instructor In Charge
BIO F215