

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI, HYDERABAD CAMPUS
FIRST SEMESTER 2019-2020
Course Handout (Part-II)

01/08/2019

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

Course No. : BIO G651
Course Title : PROTEIN AND ENZYME ENGINEERING
Instructor-in-Charge : RAMAKRISHNA VADREVU
Team of Instructors : Mr. Shivakumar Sharma

1.Course Description: The course will provide fundamental insights into the aspects of protein engineering principles, techniques and recent advances in manipulating proteins and enzymes, and their clinical and biotechnology applications. Enzyme production, kinetics and immobilization methods will be emphasized together with case studies to reinforce the impact of protein and enzyme engineering in basic biological research and biotechnology applications. The main objective of the course is to understand the principles and procedures to altering proteins and enzymes for applications in diverse areas.

2.Text Book (T): G. Tripathi, Enzyme Technology, Second Edition, 2009, ADB Publishers

3.Reference Books

- R1.** Sheldon Park and Jennifer Cochran. Protein Engineering and Design. CRC Press, 2010
R2. Carl Branden & John Tooze, Introduction to Protein Structure, Second Edition, Garland Publishing Inc.
 In addition to the text and reference books, necessary and relevant material is indicated as Review(s) and will be provided.
R3. Methods in Molecular Biology Volume 244: Protein Purification Protocols (IInd Ed) Ed. Paul Cutler, Humana Press
R4. Enzyme Technology, Noorlabettu Krishna Prasad, PHI Learning Private Ltd. New Delhi, 2011.

4 Course Plan :

Lec. No.	Topic	Learning Objective	Reference to Text /Ref. Books
1	Protein engineering	Perspective	Class Notes
2-9	Protein structure /function & Protein Folding review	Protein Structure Hierarchy, Classes Protein folds and concept of active site structures in some protein folds. Protein structure, stability and folding, CD/FL spectrophotometric methods for structure and stability analysis	R2, Class Notes/Reviews
9-13	Protein/enzymes production	Sources Isolation Purification methods Storage of proteins	R3 Class Notes
14-23	Overview of methods in Protein Engineering	Phage Display Systems Cell Surface Display Systems Cell Free Display Systems Library construction Computational	R1 Class Notes
24-31	Strategies of Protein/Enzyme Engineering	Rational Methods De novo design Directed Evolution Knowledge-Based Protein Design	R1 Class Notes Reviews
31-33	Enzymes and Protein Modifications	Properties of Enzymes Protein modifications (Mass spec applications),	T1

34-36	Enzyme Kinetics	Free energy of activation Factors affecting Enzyme kinetics Michaelis-Menten Theory of Enzyme kinetics Linear equations Enzyme inhibition	T1 Class notes,R4
36-40	Enzyme Immobilization	Immobilization techniques, experimental procedures, properties of immobilized enzymes, enzyme stabilization	T1, Class notes,R4
41-42	Applications of free and immobilized enzymes	Clinical and industrial applications, specific examples	T1, Class notes/self- study from recent literature,R4

5. Evaluation Scheme:

Evaluation Component	Duration	Weightage (%)	Date & Time	Remarks
Mid Sem	90 min	20	05.10.19 (3.30 – 5.00 PM)	Closed Book
Assignments and or Quizzes (Class/Take Home) Research Design etc.		20	TBA	Open Book
Practical (Hands on/Record Book/Class Interaction/viva)	Stipulated hours in the TT	20	TBA	Closed Book/Open Book
Comprehensive	3 hours	40	14.12.19 (AN)	Closed Book

6.Chamber Consultation Hour: Will be announced in the Class.

7.Notices: Notice, if any, concerning the course will be displayed only on the **Biological Sciences Department Notice Board**.

8.Make-up Policy: For genuine cases only for Midsem & Compre. Prior permission of the Instructor-in-Charge is necessary. No make-up will be granted for other components. No make-up for lab experiments/components.

9.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