BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
FIRST SEMESTER 2020-21

Dated: 17.08.20

Course Handout Part II

Course No. : BIO F421
Course Title : Enzymology
Instructor In-charge : JAYATI RAY DUTTA
Instructors : Jayati Ray Dutta & Trinath Jamma

1. Course Description:
Enzyme nomenclature and classification; isolation and purification; structures; kinetics; regulation of enzymatic reactions; evaluation of enzymes and other proteins.

2. Scope & Objective of the Course:
This course is designed to provide a broad introduction about enzymes, including their isolation, purification, structure and kinetics. Efforts will be made to understand the molecular basis of how enzymes catalyze the biological and non-natural reactions. Emphasis will be given to study the practical and industrial application of enzymes. This course integrates basics as well as current advances in enzymology and will create research interest among the students.

3. Text Book (TB):
1. Trevor Palmer and Philip Bonner, Enzymes: Biochemistry, Biotechnology, Clinical Chemistry., East-West Press Private Limited, New Delhi, 2nd Edition, 2008. (Available in Amazon).

4. Reference Book (RB):
R1. Lehninger Principles of Biochemistry. David L. Nelson, Michael M. Cox. W.H. Freeman & Company, NY, USA, 7th Edition, 2017.
R2. Methods in Enzymology - Guide to Protein Purification, Vol 463, Edited by BR Richard & Murray P. Deutscher. Academic Press, 2nd Edition, 2009.
R3. Fermentation Microbiology and Biotechnology, Edited by El-Mansi EMT, Bryce CFA et al., CRC Press, Taylor & Francis Group, USA, 3rd Edition, 2012.

5. Course Plan:

Lec. No.	Learning Objectives	Topic to be covered	Ref. to Chapters
1	Getting introduced to the basic concept of enzymes, their significant properties, varied applications in medicine, biotechnology and industry.	Broad overview of the subject and field of Enzymology and brief history. Quick preview of the entire course contents.	Chap 1, T1
2-3	Will be familiarized with the scientific system of enzyme naming and the different types of enzymes.	EC system of classification; Seven main classes of enzymes, with examples.	Chap 1, T1
4-7	Will be able to appreciate the close association between enzyme protein structure and its biologic function.	Enzyme structure and conformations; Types of enzyme specificity; Specificity Hypotheses.	Chap 2, T1; Chap 4, T1
8-10	Will get to know of the applications of enzymes in analytical techniques.	Kinetic methods; Enzyme-immunoassays.	Chap 17, T1
11-13	Will learn about key techniques used in	Various Instrumental techniques used in Enzymatic analysis.	Chap 18, T1

	monitoring enzyme-catalysed reactions.		
14-21	Will be acquainted with enzyme reaction kinetics and mechanism of enzyme regulation.	Introduction to catalysis and kinetics; Kinetics of single-substrate enzyme-catalyzed reactions; Kinetics of multi-substrate enzyme-catalyzed reactions. Enzymes and metabolic regulation.	Chap 6, 7, 9, 14, T1; Chap 6, R1
22-24	Enzyme Kinetics & mechanistic basis of bio-catalysis.	Enzyme inhibition; Mechanisms of catalysis with examples; Investigation of active site structure.	Chap 8, 10, 11, T1
25-28	Will be made familiar with analytical methods used in enzyme isolation and purification from cells.	Extraction of enzymes; Enzyme assay methods; Enzyme purification techniques.	Chap 15-16, T1; R2
29-32	Will learn of the need, methods and applications of enzyme immobilization.	Methods of immobilization, Properties of immobilized enzymes and Applications.	Chap 20, T1
33-38	Will appreciate the diverse roles and applications of enzymes in clinical medicine, and several industries.	Applications of enzymes and enzymatic analysis in clinical medicine, biotechnology, and pharmacology; Industrial Production of enzymes and applications (examples: in Food, Process industry).	Chap 19-20, T1
39-42	Will be made aware of the unceasing technological potentials of enzymes in industry; recent advances and innovations in Enzyme Technology.	Enzyme & Co-factor engineering – Current trends and Future prospects in Pharmaceutical & Fermentation Industries. Enzymes & Biosensors; Latest advances in enzymes - Industrial and Research-applications will be discussed.	Chap 8, R3 & Reviews

7. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue	Remarks
1.	Test I	30 min	15	September 10 – September 20 (during scheduled class Hour)	OB
2.	Test II	30 min	15	October 9-October 20(during scheduled class hour)	OB
3.	Test III	30 min	15	November 10-November 20 during scheduled class hour)	OB
4.	Seminars		15		OB
5.	Assignments		15		OB
6.	Comprehensive	120 min	25	TBA	OB

8. Chamber consultation hour: To be announced in the class. (jayati@hyderabad.bits-pilani.ac.in; trinath@hyderabad.bits-pilani.ac.in).

9. Notices: All notices will be displayed on Course management system.

10. Make-up policy: Make-up decisions will be considered for only genuine cases and validated by proper evidence of illness. No make-up for assignments.

11. 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 F421