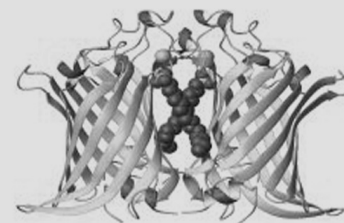


22BT201 BIO CHEMISTRY AND ENZYMOLOGY

Hours Per Week :

L	T	P	C
3	0	2	4



source: <https://biochemistry.conferenceseries.com/events-list/enzymology-biochemistry>

PREREQUISITE KNOWLEDGE: Biology and Organic chemistry.

COURSE DESCRIPTION AND OBJECTIVES:

This course is intended to imbibe concepts of biological macromolecules and their role in the metabolism. It also focuses on classification, isolation and kinetics of enzymes. Techniques employed in estimation and characterization of biomolecules are also emphasized.

MODULE-1

UNIT-1

9L+0T+6P=15 Hours

BIOMOLECULES AND THEIR METABOLISM

Mono, di, oligo and polysaccharides, Stereo isomerism and optical isomerism of sugars, Nitrogen cycle, Amino acids, physio chemical properties of amino acids, Organizational structure of proteins, Lipids - Importance & Classification, Fatty acids Structures and properties, Storage Lipids & membrane lipids, Structure and properties of purines and pyrimidines, nucleic acids.

UNIT-2

15L+0T+10P=25 Hours

METABOLISM OF NITROGEN COMPOUNDS

Metabolism of carbohydrates - Glycolysis, Krebs cycle, Electron Transport chain, Gluconeogenesis, Entner - Doudoroff pathway, Pentose Phosphate pathway and its importance in nucleic acid synthesis, Metabolism of amino acids - Glutamate pathway, Serine pathway, Shikimate pathway, Metabolism of lipids-Biosynthesis of fatty acids, Beta oxidation, Metabolism of purines and pyrimidines - biosynthesis and degradation.

PRACTICES:

- Qualitative assessments of Carbohydrates and proteins.
- Comparison of the estimation of reducing sugars by Benedicts & Dinitro-salicylic acid (DNSA) method in relation to their sensitivity and specificity.
- Comparison of protein quantification by Biuret & Lowry methods in relation to their sensitivity, specificity and interference.
- Estimation of DNA by diphenylamine method.
- Estimation of RNA by Orcinol method.
- Estimation of Cholesterol by Zak Method.

MODULE-2

UNIT-1

9L+0T+6P=15 Hours

CONCEPTS OF ENZYMES

Classification of enzymes, Principles of catalysis - collision theory, transition state theory, Role of entropy in catalysis, Concept of active site and energetics of enzyme substrate complex formation, Specificity of enzyme reaction, Methods of immobilization of enzymes-physical & chemical techniques, Limitation & applications of immobilized enzymes.

SKILLS:

- ✓ Detection of macromolecules by biochemical and calorimetric assays.
- ✓ Quantification of biomolecules using spectrophotometer.
- ✓ Purification and quantification of enzymes from various sources.
- ✓ Analyzing the effect of parameters such as concentration of substrate, pH and temperature on enzyme production.

UNIT-2**15L+0T+10P=25 Hours****ENZYME KINETICS**

Kinetics of single substrate reactions: Michaelis–Menten model, Multi-substrate reaction mechanisms and kinetics, Types of Inhibition -kinetic models, Substrate and product inhibition, Allosteric regulation of enzymes, Kinetics of immobilized enzyme, Effect of external mass transfer & intra-particle diffusion, Bioreactors using immobilized enzyme.

PRACTICES:

- Extraction of at least three commercially important enzymes and their characterization.
- Purification of enzymes – Ammonium sulfate precipitation & dialysis.
- Determination of enzyme activity & specific activity.
- Estimation of Michaelis - Menten parameters.
- Effect of pH on enzyme activity.
- Effect of temperature on enzyme activity.
- Techniques of enzyme immobilization: matrix entrapment, ionic and cross linking.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Employ suitable technique for characterization of biological macromolecules.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Appraise the significance of biomolecules in maintaining the homeostasis.	Analyse	1	1,2,4,5,9, 10
3	Categorize the nature of enzymes and able to appreciate their role in cellular functioning.	Analyse	2	1,2,4, 5, 9, 10
4	Evaluate the influence of physico-chemical properties of enzymes during their industrial application.	Evaluate	2	1,2,4, 5, 9, 10

TEXT BOOKS:

1. J L Jain, Sunjay Jain and Nitin Jain, "Fundamentals of Biochemistry", 7th edition, S Chand, 2016.
2. T Palmer and P L Bonner, "Enzymes: Biochemistry, Biotechnology, Clinical Chemistry", 2nd edition, Affiliated East-West press, 2017.

REFERENCE BOOKS:

1. David L. Nelson and Michael M. Cox Lehninger, "Principles of Biochemistry", 8th edition, W. H. Freeman & Co, 2021.
2. J M Berg, John L Tymoczko and L Stryer, "Biochemistry", 9th edition, W.H. Freeman, 2019.
3. Donald Voet, Judith G. Voet, "Biochemistry", 4th edition, Wiley, 2010.