

Course No.	Course Name	L-T-P-Credits
CY 533	Biochemistry and Medicinal Chemistry	3-0-0: 03
Prerequisite: NIL		
Course Objectives:	The main objective of this course is to make acquainted the students with the fundamental concepts of biochemistry, medicinal chemistry in terms of drug discovery and development. The course is designed for the students who have a background and interest in specifically in organic chemistry. The course will helped the students in the understanding of structures and functions of various biomacromolecules, cell membrane followed by discussion in the domain of medicinal chemistry.	
Course Outcomes:	After successful completion of the course, students will be able to: <ol style="list-style-type: none"> 1. Understand structure and functions of different biological macromolecules e.g. protein, nucleic acids, enzymes etc. 2. Understand the basic structural aspects of cell membrane and related matters of ions transport phenomena. 3. Evaluate the molecular weights of different biomacromolecules using experimental biophysical techniques. 4. Learn about the drug discovery and related development. 5. Understand the concepts drugs and their interactions with diverse receptors. 6. Identify the drug classifications, their chemistry, functions and applications. 	
SYLLABUS		
Module	Contents	Hours
I	Peptides Amino acids, polypeptide and protein structure, biosynthesis of amino acids, ribosome, mechanism of protein synthesis, sequencing of amino-acids in polypeptides, introduction to protein folding problems	07
II	Nucleic acids Classifications, nucleotides structure and their functions, biosynthesis of nucleotides, replication of DNA and RNA transcription	04
III	Enzymes and catalysis Substrate specificity of enzymes, requirement of coenzymes, regulation of enzyme activity and allosteric effect, enzyme nomenclature, enzyme kinetics and the Michaelis-Menten equation, various types of enzyme inhibition. Application of enzymes in chemical synthesis, enzyme models and their applications	05
IV	Cell membrane and molecular weight determination of biopolymers Structure and functions of cell membrane, ion transport through cell membrane, molecular weight determination of biopolymers by various experimental techniques: sedimentation equilibrium, diffusion, sedimentation velocity, viscosity and electrophoresis	04
V	Introduction to medicinal chemistry Concept of drugs and their interactions: structure-activity relationship, lead compound and lead modification, chemotherapeutic index, drug-receptor interaction, model of drug-receptor interaction, pharmacodynamics, pharmacokinetics; mechanism of drug action,	16

	<p>molecular modelling of drugs; introduction to combinatorial chemistry.</p> <p>Sulpha drugs: sulpha drugs (sulphonamide), mode of action and sulfa allergy.</p> <p>Antibiotics: introduction and classifications; structure-action relationship of different classes of antibiotics like, β-lactam group of antibiotics, aminoglycoside antibiotics, tetracyclines, chloramphenicol, macrolide and peptide antibiotics, tuberculosis and drug resistance bacteria.</p> <p>Antimalarial: malaria and life cycle of malaria parasites, structure-action relationship of quinine, chloroquine, artemisinin and its derivatives</p> <p>Antiviral and anti-cancer drugs: antiviral drugs and their mode of action, anticancer drugs: taxol, 5-fluorouracil.</p>	
--	---	--

Essential Readings:

1. A. L. Lehninger, D. L. Nelson, M. N. Cox, "Principles of Biochemistry", W. H. Freeman, 6th Edition, 2013.
2. D. Voet, J. G. Voet, "Biochemistry", John Wiley, 4th Edition, 2011.
3. R. Silvermann, "The Organic Chemistry of Drug Design and Drug Action", Academic Press, 2nd Edition, 2012.

Supplementary Readings:

1. G. Thomas, "Medicinal Chemistry: An Introduction", John Wiley & Sons Ltd., 2nd Edition, 2007.
2. V. K. Ahluwalia, "Medicinal Chemistry", Ane Books Pvt. Ltd., 2nd Edition, 2012.
3. G. L. Patrick, "An Introduction to Medicinal Chemistry", Oxford University Press, 5th Edition, 2013.
4. V. T. Palmer and B. L. Palmer, "Enzymes: Biochemistry, Biotechnology, Clinical Chemistry", East West, 2nd Edition, 2008.