Course Type	Course Code	Name of the Course	L	T	P	Credit
DE	NCYD539	Basics of Chemical Biology	3	0	0	3

Course Objectives

- This course will introduce students to the fundamental concepts of chemical biology, biological assays in modern drug discovery and the concepts that are essential for addressing problems of biology at molecular level.

Learning Objectives

Students will learn

- Basic concepts of biochemistry and chemistry of biological macromolecules
- Biological assays used in preclinical research
- Applications of chemical probes to understand biological systems
- Novel therapeutic strategies

Unit	Topics to be covered	Lecture Hours	Learning outcomes
1	Introduction; chemical interactions in macromolecules; amino acids; proteins-structure, function and types; protein-ligand interactions; nucleic acids; Structure and properties of DNA and RNA; Replication, transcription and translation.	10L	• Basic concepts of biological macromolecules • Understanding the central dogma of biochemistry
2	Enzymes: types; Enzyme kinetics; Inhibitors: competitive and non-competitive inhibitors; allosteric effect; Lineweaver burk plot; Michaelis Menten equation; Cellular signaling pathways; Small molecules in signal transduction; Understanding mutations;	10L	• Enzymes- function and inhibition • Examples of signaling pathways involved in diseases like cancer
3	Biological assays: Introduction to biological assays; Detection methods: colorimetric, fluorescence and bioluminescence based assays; Enzymatic and cellular assays; MTT assay- chemical basis and application; anti-bacterial and anti-viral assays; Western blots; PCR;	10L	• Biological assays • Determining the choice of assay for given biological problem
4	Small molecule probes to elucidate biological systems; Covalent probes; Peptides as probes; Chemical basis of drug properties; Next generation therapeutics; Biological therapeutics: Monoclonal antibodies and vaccines;	12L	• Application of chemistry to solve biological problems • Novel therapeutic strategies
	Total	**42**	

Textbooks:

1) Lehninger Principles of Biochemistry, W.H.Freeman & Co Ltd; 8th ed. 2021 edition
2) Herbert Waldmann, Petra Janning; Chemical Biology: Learning through Case Studies; 1st Ed. 2009; Wiley-VCH

Reference Books:

1) Herbert Waldmann, Petra Janning; Concepts and Case Studies in Chemical Biology; 1st Ed. 2014; Wiley-VCH
2) Marco F. Schmidt; Chemical Biology and Drug Discovery; 1st Ed 2022; Springer-Verlag GmbH
3) Jonathan E. Hempel, Charles H. Williams, Charles C. Hong; Chemical Biology Methods and Protocols;

1st Ed; 2015 Humana press Springer Protocols