

Course Code	Course Name	Credits
26CH608	BIOMOLECULES	04

Course Objectives

- To provide students with insight into the essential role of organic chemistry in biology.
- To explain the importance of biomolecules in living systems.
- To highlight the vital roles of carbohydrates, amino acids, lipids, enzymes, and vitamins.
- To develop understanding of how these biomolecules function in biological processes.
- To introduce biosynthetic organic methodologies and their applications.

Learning Outcomes

Upon successful completion of this course, it is intended that a student will be able to:

- Understand the structure, classification, stereochemistry, and functions of carbohydrates, proteins, lipids, and nucleic acids.
- Explain the structure–function relationship of biomolecules including enzymes and biological macromolecules.
- Apply concepts of enzyme kinetics, inhibition, and mechanism of enzyme action in biological systems.
- Evaluate the role and biochemical importance of vitamins and biomolecules in metabolic and cellular processes.

Unit-1 –Carbohydrates (12 Hrs.)

Definition; classification; stereoisomeric forms; structure; functions and reactions of biologically important carbohydrates – monosaccharides (glucose, fructose, mannose, galactose); disaccharides (sucrose, lactose, maltose, cellobiose); structural and storage polysaccharides – starch, glycogen, inulin, hemicelluloses, cellulose, lignin, chitin and peptidoglycans.

Unit 2 – Amino acid, peptide and proteins (12 Hrs.)

Essential and non-essential amino acids; amino acids as building blocks of proteins; classification, structure and properties of amino acids; peptide bond; biologically important peptides; proteins – primary, secondary, tertiary and quaternary structures.

Unit 3 –Lipids (12 Hrs.)

Definition and nomenclature; fatty acids and their types; structure and biological functions of various classes of lipids – triacylglycerols, phospholipids, glycolipids, sphingolipids, terpenoid lipids including steroids, alkyl glyceryl ethers and waxes.

Unit 4 – Nucleic acids (12 Hrs.)

Nucleic acids as genetic material; building blocks – purines and pyrimidines, nucleosides, nucleotides; DNA – double helix structure, properties and functions, chromosomal organization; RNA – structure and functions of mRNA, tRNA and rRNA.

Unit 5 – Enzymes and vitamins (12Hrs.)

Enzymes as biocatalysts of cells; classification of enzymes; Michaelis–Menten kinetics; enzyme assay and units; active site and mechanism of enzyme action; inhibitors; allosteric enzymes; structure and functions of vitamins – thiamine, riboflavin, nicotinic acid, pantothenic acid, pyridoxine, lipoic acid, biotin, folic acid, ascorbic acid and vitamin A.

References:

1. J.L. Jain, S. Jain, and N. Jain, Fundamentals of Biochemistry, 2008, S. Chand and Company Ltd., New Delhi.
2. P. Narayanan, Essentials of Biophysics, 2000, New Age International Publishers (P) Ltd., New Delhi.
3. Stryer Lubert, Biochemistry, 2005, W.H. Freeman @Co., NY.
4. R.N. Roy, A textbook of Biophysics, New Central Book Agency Pvt. Ltd., Calcutta.
5. Upadhyay, Upadhyay & amp, Nath Biophysical Chemistry, Himalaya Publ. House, Bangalore.
6. Bangalore.

Websites and eLearning Sources:

1. <https://nptel.ac.in/courses/104103121>
2. https://youtu.be/33q_lG0LgOw?si=rhB7gKq493md38p8

COs and Bloom's Taxonomy Mapping – 26CH608

Course Outcomes	On completing P.G. program the students will be able to	BTL
CO1	Recall and understand the definitions and classifications of carbohydrates, amino acids, lipids, nucleic acids, and enzymes, including their structures and roles.	K1, K2
CO2	Apply knowledge to describe the structures, functions, and reactions of carbohydrates, peptides, lipids, DNA, and enzyme mechanisms.	K3
CO3	Analyze the structures and functions of carbohydrates, proteins, lipids, RNA, and vitamins.	K4
CO4	Evaluate the roles of carbohydrates, proteins, lipids, nucleic acids, enzymes, and vitamins in biological processes and health.	K5
CO5	Create descriptions and analyses of polysaccharides, amino acids, lipids, chromosomal organization, and vitamins in biological systems.	K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

Relationship Matrix – 26CH608

Course Outcomes	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	1	1	1	2	3	3	2	2	2	2
CO2	2	3	3	2	2	2	2	3	2	2	2	2.2
CO3	2	3	2	2	2	1	2	3	2	3	2	2.2
CO4	3	3	3	2	2	2	3	3	2	3	2	2.5
CO5	3	3	3	2	2	3	3	3	3	3	3	2.8
Total												2.3

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

