

Course Code	Course Name	Credits
26ZY011	FUNDAMENTALS OF BIOCHEMISTRY	04

Course Objectives

- To understand the fundamental concepts and scope of biochemistry.
- To study the structure, properties, and functions of biomolecules.
- To gain knowledge about enzymes, metabolism, and bioenergetics.
- To understand the biochemical basis of cellular activities and regulation.
- To develop analytical and problem-solving skills in biochemistry.

Learning Outcomes

- Explain the structure and functions of carbohydrates, proteins, lipids, and nucleic acids.
- Demonstrate knowledge of enzyme action and metabolic pathways.
- Analyze biochemical reactions and energy transformations in living systems.
- Apply principles of biochemistry to understand cellular and physiological processes.
- Evaluate the importance of biochemistry in health, nutrition, and biotechnology.

Unit 1 – Introduction to Biochemistry and Biomolecules (12 Hrs.)

Definition, scope, and importance of biochemistry; chemical basis of life; structure and properties of water; pH and buffers; carbohydrates: classification, structure, and functions; monosaccharides, disaccharides, and polysaccharides.

Unit 2 – Proteins and Lipids (12 Hrs.)

Amino acids: classification and properties; peptide bond and protein structure; levels of protein organization; properties and functions of proteins; lipids: classification, structure, and functions; fatty acids, triglycerides, phospholipids, and cholesterol.

Unit 3 – Enzymes and Bioenergetics (12 Hrs.)

Classification and nomenclature of enzymes; mechanism of enzyme action; factors affecting enzyme activity; coenzymes and cofactors; concept of bioenergetics; ATP and high-energy compounds; biological oxidation and electron transport chain.

Unit 4 - Metabolism of Biomolecules (12 Hrs.)

Carbohydrate metabolism: glycolysis, Krebs cycle, and glycogenesis; lipid metabolism: beta oxidation and lipogenesis; protein metabolism: transamination and deamination; regulation of metabolic pathways; metabolic disorders.

Unit 5 - Nucleic Acids and Molecular Biochemistry (12 Hrs.)

Structure and types of nucleic acids; DNA replication; transcription and translation; genetic code and protein synthesis; regulation of gene expression; applications of biochemistry in medicine, agriculture, and biotechnology.

Reference Books:

1. Lehninger, A.L., Nelson, D.L., and Cox, M.M. (2017). Principles of Biochemistry. W.H. Freeman and Company.
2. Satyanarayana, U. and Chakrapani, U. (2013). Biochemistry. Elsevier Publications.
3. Voet, D. and Voet, J.G. (2011). Biochemistry. John Wiley and Sons.
4. Harper, H.A. (2015). Harper's Illustrated Biochemistry. McGraw Hill Education.
5. Conn, E.E. and Stumpf, P.K. (1987). Outlines of Biochemistry. Wiley Eastern Ltd.

Websites and eLearning Sources:

<https://openstax.org/details/books/biology-2e>
<https://www.biologydiscussion.com/biochemistry>
<https://www.easybiologyclass.com/category/biochemistry/>