

Educational Objectives:

1. This course presents the relationship of biomolecular structure to function, enzyme catalysis, regulation of gene expression, and selected topics of current biochemical research.

2. **Course Outcomes:**

- a. Student should be able to apply the learnt knowledge in research environment by making reasonable inductions and deductions.
- b. Use the knowledge gained to predict outcomes of some common biochemical reactions.
- c. Be able to evaluate and use the 3D structure of organic compounds used in biochemistry to predict behavior of organic molecules and appreciate their diversity of structure and function.

3. **Course Contents:**

- a. Introduction
- b. Biomolecules
- c. Carbohydrates
- d. Lipids and Membranes
- e. Metabolism
- f. Glycolysis.
- g. Glycogen Metabolism.
- h. Role of Biochemistry in Signal Transduction.
- i. Transport through Membranes.
- j. Citric Acid Cycle.
- k. Electron Transport and Oxidative Phosphorylation.

- l. Other Pathways of Carbohydrate Metabolism.
- m. Photosynthesis.
- n. Lipid Metabolism.
- o. Amino Acid Metabolism.
- p. Energy Metabolism: Integration and Organ Specialization.
- q. Nucleotide Metabolism.
- r. Expression and transmission of genetic information
- s. DNA/RNA synthesis; Translation (Molecular Basis)
- t. DNA Damage and Repair
- u. Proteins and Enzymes
- v. Enzymes Kinetics
- w. Directed evolution of enzymes
- x. Antibiotics
- y. Regulation of Gene Expression in Eukaryotes
- z. Epigenetic Mechanisms of Gene Regulation
- aa. Ubiquitin-Proteasome System in Protein Regulation

4. **Recommended Books:**

- a. Principles of Biochemistry by Lehninger
- b. Principles of Biochemistry by Donald Voet
- c. Biochemistry: Jeremy M. Berg, John L. Tymoko, Lubert Stryer
- d. Harper's Illustrated Biochemistry