

LSC 403 - BIOCHEMISTRY- I

1. An overview of Biochemistry, Cellular environment and applicability of basic laws of chemistry and thermodynamics. Concept of small and macromolecules, Molecular interactions and its importance in understanding cellular processes.
2. Macromolecules, proteins, glycoproteins, glycolipids, lipoproteins, polysaccharides, lipopolysaccharides, monosaccharides and derivatives of sugars, polysaccharides, glycosaminoglycans, proteoglycans, protein glycosylations and its significance. Lipids and fatty acids, triacylglycerols, glycerophospholipids, sphingolipids, cholesterol lipid bilayers.
3. Structure of amino acids and peptide bonds, Ramachandran Plot, alpha helical and beta pleated structures, structures of fibrous proteins like keratin, fibroin, elastin and collagen
4. Dynamics of protein structure, protein stability, globular proteins and maintenance of specific confirmation, structural motifs commonly found in various proteins and their functional relevance. Basic concepts of protein structure and folding, folding pathways, role of accessory proteins in protein folding.
5. Hemoglobulin, Myoglobin, oxygen binding kinetics and its relation to the structure of Hb, mechanisms of cooperability, and oxygen and carbon dioxide transport.
6. Biological membranes, integral membrane proteins, lipoproteins and trafficking through membrane.
7. Classification of enzymes, factors affecting enzymes activities, feedback and allosteric inhibition. Enzyme catalysis, mechanisms and specificity of enzymatic action, coenzymes and vitamins. Chemical kinetics and order of reactions, Michaelis and Menten equation, V_{max} and Michaelis constant, Competitive and non-competitive inhibition.
8. Characterization of proteins, isolation and chromatographic purification of proteins, ultracentrifugation, sequence determination, mass spectrometry, specific activity, biochemical calculations.

Suggested Readings

1. Biochemistry - by Jeremy Berg, John Tymoczko and Lubert Stryer
2. Biochemistry - by Donald J. Voet and Judith G. Voet
3. Lehninger Principles of Biochemistry - by David L. Nelson and Michael M. Cox