

LS401A Biochemistry 3 Credits		
Name of the Faculty: Prof. Sneha Lata Panwar*; Dr. Vikas Yadav		
Sr.No.	Topic	Faculty Name/ Contact Hours
1.	History of Biochemistry, evolution of the concept of the applicability of basic laws of chemistry and thermodynamics in cell function, concept of molecular interactions and their importance in understanding cellular processes.	VY/2
2.	Structure of amino acids, peptide bonds, Ramachandran Plot, alpha helical and beta pleated structures-I	VY/1
3.	Structure of amino acids, peptide bonds, Ramachandran Plot, alpha helical and beta pleated structures-II	VY/1
4.	Motifs, domains, super secondary structures of proteins, Structures of fibrous proteins like collagen, keratin, and elastin. Classification of proteins based on the structures like Zn finger, leucine zipper proteins. Functional relationship between domains and function of proteins.	VY/2
5.	Evolution of haemoglobin and myoglobin and their differences. Hemoglobin structure and its physiological functions as an oxygen transporter.	VY/2
6.	Oxygen binding properties of hemoglobin and mechanisms of cooperability in oxygen binding.	VY/1
7.	Isolation and purification of proteins by various conventional and advance methods.	VY/2
8.	Basic concepts of protein folding and stability, folding pathways, role of accessory proteins in protein folding.	VY/2
9.	Monosaccharides and derivatives of sugars, polysaccharides, glycosaminoglycans, proteoglycans, protein glycosylation and its significance	SLP/2
10.	Fatty acids, triacylglycerols, glycerophospholipids, sphingolipids, cholesterol lipid bilayers	SLP/1
11.	Biological membranes, integral membrane proteins, lipoproteins and trafficking through membrane	SLP/1
12.	Protein structure and function: enzyme functions, specificity of enzymes. Induced fit model of enzyme function. Electronic and geometrical compatibility.	SLP/2
13.	Enzyme catalysis: Mechanisms of acid base, covalent, metal ion catalysis, Mechanisms of actions of serine proteases, glutathione reductases, coenzymes and Vitamins, Factors affecting enzymes activities.	SLP/2
14.	Chemical kinetics and order of reactions, Michaelis and Menten equation, V_{max} and Michaelis constant, Types of enzyme inhibition: feedback, allosteric, competitive, non-competitive inhibition.	SLP/2
15.	Metabolism and energetics: Basic concepts, central role of ATP in metabolism, carbon fuel and its oxidation, concept of energy rich compounds and intermediates, common types of reactions involved in metabolism	SLP/1
16.	Glycolysis and gluconeogenesis, Regulation of glycolysis, metabolic flux and its regulation by various metabolic intermediates	SLP/2

17.	TCA cycle, its regulation, its role in energy generation, its role in generating biosynthetic intermediates, glyoxylate cycle	SLP/1
18.	Pentose phosphate pathway and its importance in biosynthetic Reactions	SLP/1
19.	Glycogen synthesis, breakdown and its regulation	SLP/2
20.	Fatty acid biosynthesis and degradation	SLP/3
21.	Synthesis and degradation of steroids	SLP/1
22.	Redox reaction, mitochondrial structure and its role in energy metabolism, electron transport system, ATP synthesis and chemo-osmotic hypothesis of ATP generation	VY/4
23.	Amino acid metabolism, Urea cycle, one carbon reaction, non-protein amino acids, amines and their role in cell function	VY/3
24.	Nucleotide biosynthesis and metabolism, salvage pathways, its regulation and diseases	VY/2
25.	Biochemical problems	SLP/1

Further Reading:

1. Lehninger Principles of Biochemistry; David L Nelson, Michael M Cox
2. Biochemistry Voet & Voet
3. Biochemistry by Lubert Stryer
4. Fundamentals of Biochemistry by Charlotte Pratt
5. Textbook of Biochemistry by Edward S West & Wilbert R Todd