

Lecture Plan

Name of the College: Government College of Arts, Science and Commerce. Sanquelim - Goa

Name of Faculty: Dr. Vaibhav Chindarkar

Subject: Zoology

Paper code: ZOC 106 Biochemistry & Metabolic processes

Program: T.Y. BSc

Division: A

Academic year: 2024- 2025

Semester: V

Total Lectures: 60

- **Course Objectives:**
- **To Describe and analyse the principles of metabolism and metabolic pathways along with their regulation and acquire skills in biochemical techniques. (K, An, Ap)**
- **To interpret the fundamental principles governing channelisation of energy through Biological systems (K, An)**
- **To understand the pathways involving carbohydrate, protein and fat metabolism. (k, U)**
- **To explain and analyse the complex relationship between various metabolic pathways and demonstrate the skills in Biochemical techniques (K, U, Ap)**

Expected Course Outcome: Understanding intricacies of Biochemical reactions and nature and regulation of metabolic pathways

Student Learning Outcome: The student will be able to understand general metabolism, anabolic and catabolic reactions and various metabolic pathways involved in Carbohydrate, Protein and Lipid metabolism and their regulation

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June	28/06/2024	29/06/2024	01	Introduction to Biochemistry		Power point presentation	Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources

July	01/07/2024	06/07/2024	04	Metabolism introduction		Power point presentation	Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Stages of catabolism,			
				Sub divisions of Metabolism			
				Sub divisions of Metabolism...contd			
July	08/07/2024	13/07/2024	04	Catabolism vs. Anabolism		Power point	Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Catabolism vs Anabolism contd.....			
				regulation of Metabolic pathways			
				Shuttle systems: Need for shuttle system, Malate Aspartate			
July	15/07/2024	20/07/2024	04	Shuttle systems: Glycerol phosphate.		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				membrane transporters			
				Contd....Antiport, symporters, uniport			
				Bioenergetics: Concept and principles			
July	22/07/2024	27/07/2024	04	Concept of Energy		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Laws of Thermodynamics		Power point presentation	
				Free energy		Power point presentation	
				Free energy, thermodynamic quantities		Power point presentation	
July/August	29/07/2024	03/08/2024	04	Standard Free energy change and Equilibrium constant of metabolic reactions		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd.,

				ATP as “energy currency” of the cell		Power point presentation	3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017).
				Sequence of Reactions and Regulation of Glycolysis		Power point presentation	<i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Sequence of Reactions and Regulation of Glycolysis contd.....		Power point presentation	
August	05/08/2024	10/08/2024	04	Sequence of Reactions and Regulation of Glycolysis contd.....		Power point presentation	U. Sathyanarayan and U. Chakrapani, “Biochemistry,” Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017).
				Sequence of Reactions and Regulation of Glycolysis contd.....			<i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Pentose phosphate pathway			
				Pentose phosphate pathway contd.....			
July/August	12/08/2024	17/08/2024	04	Pentose phosphate pathway contd.....		Power point presentation	U. Sathyanarayan and U. Chakrapani, “Biochemistry,” Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017).
				Pentose phosphate pathway contd.....			<i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Oxidative decarboxylation			
				Citric acid cycle			
August	19/08/2024	24/08/2024	04	Citric acid cycle		Power point presentation	U. Sathyanarayan and U. Chakrapani, “Biochemistry,” Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017).
				Gluconeogenesis			<i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Gluconeogenesis contd.....			
				Glycogenolysis			
August	26/08/2024	31/08/2024	04	Glycogenolysis contd,		Power point presentation	U. Sathyanarayan and U. Chakrapani, “Biochemistry,” Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017).
				Glycogenesis			
				Glycogenesis			

				Mitochondrial respiratory Chain			<i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
September	02/09/2024	05/09/2024	04	Mitochondrial respiratory Chain contd.....		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
			Mechanism of oxidative phosphorylation				
			Mechanism of oxidative phosphorylation contd...				
			Oxidative phosphorylation hypothesis				
September	13//09/2024	14/09/2024	04	Chemical coupling Hypothesis		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
			Conformational coupling Hypothesis				
			Chemiosmotic Coupling Hypothesis				
			Inhibitors and Uncouplers of Electronic Transport system				
September	16/09/2024	21/09/2024	04	Inhibitors and Uncouplers of Electronic Transport system contd....		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
			Inhibitors and Uncouplers of Electronic Transport system contd.....				
			Catabolism of amino acids				
			Transamination				
September	23/09/2024	28/09/2024	04	Transamination contd....		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017).
			Deamination				
			Urea Cycle				

				Urea Cycle contd....			<i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources	
September	30//09/2024	05/10/2024	04	Fate of C-skeleton of Glucogenic and Ketogenic amino acids			U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources	
				inborn errors of Amino acid catabolism		Power point presentation		
				inborn errors of Amino acid catabolism contd....				
				Beta-oxidation of fatty acids				
October	7/10/2024	12/10/2024	04	Palmitic acid {saturated (C 16:0) beta oxidation				U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Palmitic acid {saturated (C 16:0) beta oxidation contd.....		Power point presentation		
				Linoleic acid {unsaturated (C 18:2) beta oxidation				
				Linoleic acid {unsaturated (C 18:2) beta oxidation contd....				
October	14/10/2024	19/10/2024	04	Alpha oxidation			Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources
				Omega oxidation				
				Ketogenesis				
				Ketogenic and anti-ketogenic substances				
October	21/10/2024	22/10/2024	01	Regulation of ketogenesis		Power point presentation	U. Sathyanarayan and U. Chakrapani, "Biochemistry," Books and Allied (P) Ltd., 3rd Edition, Kolkata, 2007, Nelson, D. L., & Cox, M. M. (2017). <i>Lehninger principles of biochemistry</i> (7th ed.). W.H. Freeman., online resources	

*** Assessment Rubrics**

Component	Max Marks
ISA 1	10
ISA 2	10
Practical	50
Project	100
Semester End Exam	80