



University of Management & Technology
School of Science
Department of Life Science

BT-305 Biochemistry-II

Lecture Schedule	Monday (09:30 AM -10:45 AM) Thursday (09:30 AM -10:45 AM)	Semester	Spring 2021
Pre-requisite	Biochemistry-I	Credit Hours	3
Instructor	Ms Hina Batool	Contact	hina.batool@umt.edu.pk
Office	3S-37	Office Hours	See office window
Course Description	<p>Biochemistry is at the core of many areas of biology and is responsible for a large number of scientific breakthroughs in medicine and biotechnology. Biochemistry-II is a comprehensive biochemistry course which includes metabolic pathways of amino acids/proteins, carbohydrates, lipids, nucleic acids. This course deals with kinetics, energy requirements, metabolic regulation in living cells. In this course, the main principles of metabolic biochemistry, the general catalytic and regulatory mechanisms of enzymes are also discussed. This understanding of cell function provides a foundation for many subjects in biological and biomedical sciences. Emphasis is placed on mastering and understanding the principles of cellular reactions and their application to diverse cell types.</p>		
Expected Outcomes	<p>Upon completion of this in-depth course on bioenergetics and metabolism, students should have mastered the concepts, and skills and can be able to:</p> <ol style="list-style-type: none"> 1. Differentiate the anabolic and catabolic pathways and their important enzymatic steps. 2. Estimate energy yield requirements and thermodynamic considerations. 3. Extrapolate how regulation of biochemical pathways leads to normal integrated metabolism. 		
Textbook(s)	<ol style="list-style-type: none"> 1. Lehninger Principles of Biochemistry, by David L. Nelson and Michael M. Cox, 6th Edition, Macmillan International Edition. 2. Biochemistry, by Biochemistry. Jeremy M. Berg, John L. Tymoczko, Lubert Strye, 7th Edition, Palgrave MacMillan. 		
Grading Policy	<ul style="list-style-type: none"> • Quizzes 20% • Assignment 15% • Presentation/Project 05% • Mid-term exam 25% • Final Exam 35% 		

Course Schedule

Week	Lecture #	TOPICS	Chapter Name
1	1 2	Introduction to metabolism Basic aspects of bioenergetics and biochemical thermodynamics (Endergonic and Exergonic reactions);	Part II Bioenergetics and Metabolism Ch:13 Principles of bioenergetics
2	1 2	Oxidation-reduction Phosphoryl group transfer and ATP production	Ch:13 Principles of bioenergetics
3	1 2	Carbohydrate metabolism Glycolysis, Fates of pyruvates, Feeders pathway, regulation of glycolysis Gluconeogenesis and its regulation	Ch: 14 Glycolysis, gluconeogenesis, And the pentose phosphate Pathway
4	1 2	Pentose Phosphate Pathway	Ch: 14 Glycolysis, gluconeogenesis, And the pentose phosphate Pathway
5	1 2	Citric Acid Cycle Electron Transport Chain,	Ch: 16 The Citric Acid Cycle Ch: 19 Oxidative Phosphorylation
6	1 2	Oxidative Phosphorylation (ATP synthesis), Glycerol-Phosphate Shunt, Malate aspartate shunt	Ch: 19 Oxidative Phosphorylation
7	1 2	Photosynthesis (Light Reaction) Calvin Cycle	Ch: 20 Carbohydrate biosynthesis In plants and bacteria
8	1 2	Nitrogen assimilation in biological systems Amino acid synthesis (Anabolism)	Ch: 22 Biosynthesis of amino acids, Nucleotides, and related Molecules
9	1 2	Midterm Exam Review Paper	
10	1 2	Amino acid degradation (Amino transferases) Urea Cycle	Ch: 18 Amino Acid Oxidation and the Production of Urea
11	1 2	Pathways of Amino acid degradation (Catabolism)	Ch: 18 Amino Acid Oxidation and the Production of Urea
12	1 2	Nucleic Acid metabolism (degradation and assimilation) and control Purine and Pyrimidine synthesis.	Ch: 22 Biosynthesis of Amino Acids, Nucleotides, and Related Molecules

13	1 2	Catabolism of fatty acids, Carnitine shuttle, Beta oxidation and regulation Ketone bodies	Ch: 17 Fatty acid catabolism
14	1 2	Biosynthesis of fatty acids	Ch: 21 Lipid Biosynthesis
15	1 2	Biosynthesis of Cholesterol	Ch: 21 Lipid Biosynthesis

HEC COURSE CONTENTS

BIOCHEMISTRY- II (2+1) Course Objectives:

This course is a continuation of Principles of Biochemistry I, and aims to familiarize students with the key concepts of intermediary metabolism of proteins, nucleic acids, carbohydrates and lipids.

Course Contents:

Introduction to metabolism and basic aspects of bioenergetics and biochemical thermodynamics (endergonic and exergonic reactions); phosphoryl group transfer and ATP production; metabolism, oxidation-reduction; carbohydrate metabolism and regulation (glycolysis, Glycogenolysis; gluconeogenesis; pentose phosphate pathway); citric acid cycle (reactions, energetics and control), electron transport chain, oxidative phosphorylation, shuttle mechanisms (glycerol-phosphate shunt), lipid metabolism (energy yield from fatty acid oxidation, ketone bodies, acyl glycerol, compound lipids, cholesterol); photosynthesis; Calvin Cycle; metabolism of nitrogenous compounds (amino acid synthesis, catabolism, purine and pyrimidine synthesis); nucleic acid metabolism and control; urea cycle; integration of metabolism.