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

BC-416 Plant Biochemistry

Lecture Schedule	Monday (5:00 PM – 6:15 PM) Wednesday (3:30 PM – 4:45 PM)	**Semester**	Fall 2019
Pre-requisite	---	**Credit Hours**	3
Instructor	Ms Hina Batool	**Contact**	hina.batool@umt.edu.pk
Office	3S-37	**Office Hours**	See office window

Course Description

Biochemistry is at the core of many areas of biology and is responsible for a large number of scientific breakthroughs in medicine and biotechnology. Plant Biochemistry is a comprehensive biochemistry course which includes the study of photosynthetic cell, photosystems, mechanisms of electron transfer and conversion of simple precursors to the complex carbohydrates by the photosynthetic machinery of plants.
Additionally, this course deals with various modifications in the photosynthesis, nitrogen assimilation, sulfur assimilation, signaling in plants as well as introduction of the secondary metabolites in plants and their significance. This understanding will provide 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.

Expected Outcomes

Upon completion of this in-depth course on plant biochemistry, students should have mastered the concepts, and skills and can be able to:

1. Understand the concepts of photosystems, mechanism of electron with ATP production.
2. Estimate energy yield requirements and thermodynamic considerations.
3. Extrapolate how regulation of photosynthetic pathways leads to normal integrated metabolism.
4. Understand that how plants adapt to different habitats by altering their metabolic pathways.

Textbook(s)

1. **Lehninger Principles of Biochemistry, by David L. Nelson and Michael M. Cox, 6th Edition, Macmillan International Edition.**
2. **Plant Biochemistry by Hans-Walter Heldt**

Grading Policy

• Quizzes	20%
• Assignment	15%
• Project	5%
• Presentations	15%
• Take Home Exam	35%
• Viva Voce	10%

Course Schedule

Week	Lecture #	TOPICS	Chapter Name
1	1 2	Introduction to Mesophyll cells, cellular membranes, organelles, transporters and their types.	Chapter 1: A leaf cell consists of several metabolic compartments (Plant Biochemistry by Hans-Walter Heldt)
2	1 2	General Features of photosynthesis, Light Absorption, Hills reaction, Electron-driven electron flow,	Chapter 19: Oxidative Phosphorylation and Photophosphorylation from Lehninger Principles of Biochemistry
3	1 2	Photosystems and their types, Features of bacterial photosystems	Chapter 19: Oxidative Phosphorylation and Photophosphorylation from Lehninger Principles of Biochemistry
4	1 2	ATP synthesis by photophosphorylation, Oxygen evolving complex in photophosphorylation	Chapter 20: Carbohydrate Biosynthesis in Plants and Bacteria from Lehninger Principles of Biochemistry
5	1 2	Photosynthetic carbohydrate synthesis, Photorespiration and C4 plants	Chapter 20: Carbohydrate Biosynthesis in Plants and Bacteria from Lehninger Principles of Biochemistry
6	1 2	CAM pathway, Biosynthesis of Starch and Sucrose,	Chapter 20: Carbohydrate Biosynthesis in Plants and Bacteria from Lehninger Principles of Biochemistry
7	1 2	Photorespiration, Regulation of photosynthesis light and dark reactions	Chapter 20: Carbohydrate Biosynthesis in Plants and Bacteria from Lehninger Principles of Biochemistry
8	1 2	Nitrogen assimilation in plants including reduction of nitrate to ammonia,	Chapter 10: Nitrate assimilation is essential for the synthesis of organic matter from Plant Biochemistry by Hans-Walter Heldt
9	1 2	transport of ammonia within biological systems, nitrate assimilation in different compartments of the plants	Chapter 10: Nitrate assimilation is essential for the synthesis of organic matter from Plant Biochemistry by Hans-Walter Heldt

10	1 2	Phytohormones and related compounds	Chapter 19: Multiple signals regulate the growth and development of plant organs and enable their adaptation to environmental conditions from Plant Biochemistry by Hans-Walter Heldt
11	1 2	Phytohormones and related compounds	Chapter 19: Multiple signals regulate the growth and development of plant organs and enable their adaptation to environmental conditions from Plant Biochemistry by Hans-Walter Heldt
12	1 2	Signal transduction in plant cells	Chapter 19: Multiple signals regulate the growth and development of plant organs and enable their adaptation to environmental conditions from Plant Biochemistry by Hans-Walter Heldt
13	1 2	Secondary metabolites and their ecological effects	Chapter 16: Secondary metabolites fulfill specific ecological functions in plants from Plant Biochemistry by Hans-Walter Heldt
14	1 2	Secondary metabolites and their ecological effects	Chapter 16: Secondary metabolites fulfill specific ecological functions in plants from Plant Biochemistry by Hans-Walter Heldt
15	1 2	Presentations	

HEC COURSE CONTENTS

Plant Biochemistry (3)

Course Objectives:

- To introduce key concepts of plant biochemistry.
- To impart knowledge regarding plant pigments, photosynthetic systems and pathways, phytohormones and naturally occurring compounds.

Learning Outcome:

Upon successful completion of the course, the student will be able to:

- Acquire basic knowledge of plant biochemistry
- Understand the nature of metabolic pathways relevant to plants.