Hashemite University

Faculty of Allied Health Sciences
Department of Medical Laboratory Sciences
Second semester, academic year (2021/2022)

Course Syllabus

Course Title: Biochemistry	Course code:
Course level	Credit hrs: 3hrs

Academic lecturer

Name	Rank	Office number	Office hours	Email address
Dr. Ismail Sami Al Mahmoud	Assistant prof			

Course objectives: The course aims to provide students with comprehensive understanding of core topics and subjects in modern biochemistry and their experimental basis, in addition to familiarize students with the major aspects and applications of biochemistry. This course helps students to build an advanced integrated knowledge of important topics, including: chemical and structural biology, biochemical techniques and biotechnology, metabolism of biological molecules, signalling pathways and diseases.

Course text books and references:

- **Main text book: Biochemistry, *Campbell and Farrell 7th, 8th or 9th edition***
- Principles and of instrumental analysis, *Holler, Skoog and Crouch*
- The Biophysical Chemistry of Nucleic Acids & Proteins, *Thomas E. Creighton*,
- The Physical and Chemical Basis of Molecular Biology, *Thomas E. Creighton*
- Research papers and reviews

week	Topics to be covered
1	**Introduction:** – **What is Biochemistry?** – **Biological compounds (Nucleic Acid, Protein, Lipid, Carbohydrate)** – **Biochemistry applications** – **Structural organization of the human body**
2	**Water and Buffers:** – **Water molecule structure and polarity** – **Hydrogen bonds** – **Acids, bases and pH** – **Buffers**
3,4	**Amino acids and peptides:** – **Chemical structures and characteristics of amino acids** – **Ionization and titration of amino acids** – **Peptide bonds** – **Peptides, physiological role and function**
5,6	**Proteins:** – **Structure and function** – **3D structure** – **Methods and techniques to study proteins in the lab.**
7	**Enzymes** – **Structure and types** – **Mechanism of action** – **Enzyme kinetics (Michaelis-Minten, Line weaver Burk)** – **Enzyme inhibition (biomedical applications)**
8,9	**Carbohydrates:** – **Structure and types** – **Stereochemistry of carbohydrates** – **Sugar derivatives (amino sugars, sugar alcohol, deoxy sugars)** – **Reactions (oxidation and reduction, esterfication,etc)** – **Function of sugars in biological systems (ABO blood system)**
10,11	**Carbohydrate metabolism:** – **Glycolysis, pathways and reactions** – **Citric acid cycle (Krebs)** – **Electron transport chain and oxidative phosphorylation** – **Energy production**
12,13	**Lipids and Lipid metabolism :** – **lipid structure, types and function** – **Fatty acids and reactions (salt formation, esterfication, Hydrogenation)** – **Triglyceride (structure and types)** – **Phospholipids (structure and types)** – **Cholesterol (structure, derivatives and function in biological systems)** – **Lipoproteins structure and types** – **Lipoproteins metabolism and physiology**
14	**Nitrogen metabolism and the Urea cycle** – **Introduction to nitrogen metabolism** – **Removal of nitrogen from amino acids** – **The Urea cycle** – **Regulation of the Urea cycle** – **Nitrogen Homeostasis in the Brain: Glutamate and Glutamine**
	FINAL EXAM

Student responsibilities and expectations:

- Excellent attendance is expected.
- At the beginning of the lecture, be on time.
- Switch off you mobile phone or put it on silent throughout the lecture.
- Exams are scheduled to be given at specific times throughout the semester, and you are expected to attend them all.