

The University of Jordan

Faculty: Pharmacy

Department: Biopharmaceutics and Clinical Pharmacy

Program: Pharmacy

Academic Year/ Fall Semester: 2014/15

**Biochemistry practical (1203252)**

Credit hours	1	Level	2 <sup>nd</sup> year	Pre-requisite	-
Coordinator/ Lecturer	Prof. Dr. Yasser K. Bustanji Dr. Areej Assaf Dr. Violet Kasabri	Office number	<a href="mailto:bustanji@ju.edu.jo">bustanji@ju.edu.jo</a> <a href="mailto:areej_assaf@ju.edu.jo">areej_assaf@ju.edu.jo</a> <a href="mailto:v.kasabri@ju.edu.jo">v.kasabri@ju.edu.jo</a>	Office phone	
Course website	-	E-mail		Place	Pharmacy

Provides hands-on-bench and complementary practices reacted to principle information concerning the chemical and physical properties of biomolecules (carbohydrates, lipids, amino acids and proteins) and their interrelated functioning in a biological system. The topics of enzymes and relevant enzyme inhibitors are also covered.

**Learning Objectives**

This course is the practical course in support of a two-semester sequence in biochemistry theory. The students are expected to:

1. Demonstrate a good awareness and understanding of biochemical principles
2. Understand the main concepts regarding the chemical and physical properties of key organic molecules used by living systems (proteins, amino acids and peptides, carbohydrates, fatty acids and lipids)
3. Know the basic concepts and kinetics of enzymes, protein structure and function, regulatory strategies in enzymes, and lipids' classes.

**Evaluation**

Evaluation	Point %	Date
Midterm Exam	30; 20: practical 10: theory	7 <sup>th</sup> week
Assignments:	20; 10: reports 10: evaluations	Throughout 12 weeks
Quizzes	10	3 out of 12 weeks
Final Exam	40; 25: practical 15: theory	12 <sup>th</sup> week

**ILOs: Learning and Evaluation Methods**

ILO/s	Learning Methods	Evaluation Methods
A. Knowledge and Understanding B. Intellectual skills (cognitive and	<b>Practicals and solving problems</b>	<b>Exams [theory + practical], Quizzes</b>

C. analytical) Transferable Skills:		
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**Reference/s:**  
-Lab Manual

ISBN	Title	Author	Year
716712261	BIOCHEMISTRY 4TH EDITION	STRYER, LUBERT	1995C
781769604	BIOCHEMISTRY LIPPINCOTT'S ILLUSTRATED REVIEWS, 4TH EDITION	CHAMPE, PAMELA; HARVEY, RICHARD; FERRIER, DENISE; COOPER, MICHAEL	2008C
7167743396	LEHNINGER PRINCIPLES OF BIOCHEMISTRY	LEHNINGER, ALBERT	2005C
9780071765763	HARPER'S ILLUSTRATED BIOCHEMISTRY-27ED.	MURRAY, ROBERT K. (ROBERT KINCAID)	2012
0272797138	ESSENTIALS OF HUMAN BIOCHEMISTRY	PATERSON, COLIN RALSTON	1983

**Intended Learning Outcomes (ILOs):**

Successful completion of the course should lead to the following outcomes:

*A. Knowledge and Understanding: Student is expected to develop Intellectual skills (cognitive and analytical) via learning:*

**A1. Introduction**

- Key organic molecules are used by living systems
- Weak Interactions in Aqueous Systems
- Ionization of Water, Weak Acids, and Weak Bases
- Buffering against pH Changes in Biological Systems
- Water as a Reactant

**A2. Carbohydrates**

- Monosaccharides Are Aldehydes or Ketones with Multiple Hydroxyl Groups
- Complex Carbohydrates Are Formed by Linkage of Monosaccharides

**A3. Lipids and Cell Membranes**

- Triacylglycerols Are Highly Concentrated Energy Stores
- Fatty Acids Are Key Constituents of Lipids
- Important sterols like Cholesterol

**A4. Amino acids and Protein Structure and Function**

- Proteins Are Built from a Repertoire of 20 Amino Acids
- Different classes of amino acids and their identification tests and protocols
- Spectrophotometric determination of serum albumin levels
- Problems

**A5. Enzymes: Basic Concepts and Kinetics**

- Enzymes Are Powerful and Highly Specific Catalysts
- Free Energy Is a Useful Thermodynamic Function for Understanding Enzymes
- Enzymes Accelerate Reactions by Facilitating the Formation of the Transition State
- The Michaelis-Menten Model Accounts for the Kinetic Properties of Many Enzymes
- Enzymes Can Be Inhibited by Specific Molecules
- Enzyme inhibitors of different modes can be successful drug candidates
- $V_{\max}$  and  $K_M$  Can Be Determined by Double-Reciprocal Plots

- Problems on competitive and non competitive enzyme inhibitors
- Substrate concentration, reaction pH and temperature can enzyme catalyzed reaction velocity

*B. Subject specific skills*

*C. Transferable Skills: Student is expected to*

*C1. Develop of problem solving and critical thinking skills.*

*C2. Use oral communication to effectively transmit ideas and conclusions to a scientific audience.*

*C3. Calculations of  $V_{max}$  and  $K_m$  in enzymatic assays. pH measurements and subsequent calculations.*

*C4. Determinations and evaluations of concentrations of blood samples' parameters using spectrophotometry (Blood glucose, blood cholesterol and blood albumin)*

**Course Contents**

<b>Week 1</b>	<b>BASIC TECHNIQUES</b>	<b>ILO/s</b>
<b>2</b>	<b>BUFFER SOLUTION</b>	<b>A &amp; B &amp;C</b>
<b>3</b>	<b>SPECTROPHOTOMETRY</b>	<b>A &amp; B &amp;C</b>
<b>4</b>	<b>MEASUREMENT OF PLASMA GLUCOSE &amp; CHOLESTEROL</b>	<b>A &amp; B &amp;C</b>
<b>5</b>	<b>IDENTIFICATION OF CARBOHYDRATES</b>	<b>A &amp; B &amp;C</b>
<b>6</b>	<b>DETERMINATION OF LIPIDS</b>	<b>A &amp; B &amp;C</b>
<b>7</b>	<b>MIDTERM EXAM [theory+ practical]</b>	<b>A &amp; B &amp;C</b>
<b>8</b>	<b>IDENTIFICATION OF PROTEINS AND AMINO ACIDS</b>	<b>A &amp; B &amp;C</b>
<b>9</b>	<b>MEASUREMENT OF TOTAL PLASMA PROTEINS AND ALBUMIN</b>	<b>A &amp; B &amp;C</b>
<b>11</b>	<b>ENZYMES and ENZYME INHIBITORS</b>	<b>A &amp; B &amp;C</b>
<b>12</b>	<b>FINAL EXAM [theory + practical]</b>	<b>A &amp; B &amp;C</b>

**Learning Methodology**

Practicals related to unknown identification and quantification and problems solving, in addition to exams.