Philadelphia University
Faculty of pharmacy
Department of Clinical sciences
First Semester, 2017/2018

Course Syllabus

Course Title: Pharmaceutical Biochemistry I	**Course code: 0510214**
Course Level: 2nd year	**Course prerequisite:** **Organic Chemistry I (0510111)**
Lecture Time: 10:10-11:10 S,T, Th	**Credit hours: 3**

Name	Rank	Office Number	Office Hours	E-mail Address
Dr. Mohammad Shomali	**Assistant Professor**	**N506**	**11-12** **11:45-12:45**	**mshomali@philadelphia.edu.jo**

Course module description:

Pharmaceutical biochemistry I, an introduction to the structure and function of biological molecules, is designed to study the molecules and macromolecules in living systems through an application of the principles of organic and physical chemistry as well as biology and genetics. This will include an examination of the structure of these molecules in detail in order to understand how their unique chemical and physical properties contribute to their biological function.

After an introduction to the basic concepts of biochemistry, the structure and function of proteins will be discussed. Special attention will be given to the methods and techniques of biochemistry and their application to proteins and nucleic acids. In order to illustrate these principles, a number of specific proteins will be discussed in detail.

The structures, specificities and mechanisms of action of selected enzymes will illustrate the enormous diversity of this group of catalytic molecules. The mechanism of action of a few enzymes will be studied in detail and general theories for the kinetic analysis of both single substrate and multi-substrate enzymes will be developed.

The structure and function of the nucleic acids will be discussed in some detail and the association of nucleic acids with proteins will introduce these important macromolecular interactions. Higher levels of organization of the genetic material will be introduced and the mechanism of DNA replication, repair, and recombination will be studied. A very brief introduction to transcription and RNA processing, translation and gene regulation will be presented.

Course module objectives:

The course is taught as an integrated view of the fundamentals of biochemical processes and cellular structure and function. At the end of the course the student will have a basic understanding of the structure of biological macromolecules and molecular composition and function of the major subcellular organelles. Emphasis will be on structure/function relationships and an appreciation of the dynamic aspects of cell organization will be fostered. The implications for drug chemistry and biochemistry will be underlined throughout the course.

Course/ module components

- **Books**

- **Lippincott, Illustrated Review Biochemistry**
- **Biochemistry, 5th edition, Jeremy M Berg, John L Tymoczko, and Lubert Stryer.**

- **Biochemistry, Fifth Edition Mary K. Campbell, Shawn O. Farrell**

- **In addition to the above, the students will be provided with handouts by the lecturer.**

References:

Students will be expected to give the same attention to this reference as given to the Module textbook.

Lehninger Principles of Biochemistry, Fourth Edition by David L. Nelson, Michael M. Cox Publisher: W. H. Freeman; 4th edition 2005 ISBN: 0716743396

Teaching methods:

Lectures and discussions

Learning outcomes:

At the end of this module, student will be able to:

- Understand the organization of human cells and the structure and function of different cellular components.
- Appreciate the relationship between bio-molecule structure and biological function.
- Know the major principles of protein synthesis.
- Know the structure and organization of DNA and RNA in cells and their role in cell growth and replication.
- Understand the application of recombinant DNA technology in medicine.

- This course should expand your problem solving skills. Scientists ask questions and solve problems. Many of you will do work that requires you to solve problems that do not have already known solutions. This will require you to apply concepts learned in one context to a new situation. Problem solving requires logic, organization, and synthesis, and it is a skill, like any other, that improves with practice. I will mentor you in this skill by giving you problems as homework, by asking you to pose questions and experiments in class.
- By the end of the program successful students who have attended regularly and completed required work will recognize the applicability of biochemistry to the careers to which they will be progressing.

Assessment instruments

- **In-class quizzes**
- **Major and final exames**

Allocation of Marks	
Assessment Instruments	**Mark**
First examination	**20%**
Second examination	**20%**
Final examination:	**40%**
Quizzes	**20%**
Total	**100%**

Documentation and academic honesty

All University policies regarding academic integrity apply to this course. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor.

Course/module academic calendar

Week	Basic and support material to be covered	Homework/reports and their due dates
(1)	Course Introduction Amino acids Protein Structure and Properties.	
(2)	Protein Structure and Properties.	
(3)	Protein Folding.	
(4)	Mechanisms of Enzyme Catalysis.	
(5)	Enzyme Inhibition and Inactivation Reversible Enzyme Inhibitors Selected Examples of Competitive Reversible Inhibitor Drugs.	
(6)	Irreversible Enzyme Inhibitors. Selected Examples of Drug In-activators. Natural Regulation of Enzymes. Enzyme Therapy.	
(7)	Biological Membranes. Carbohydrates and Lipids as Components of Biological Membranes.	
(8)	Receptor Structure. Drug-Receptor Theories. Principles of Receptor Classification.	**8th Week**
(9)	Intracellular Signal Transduction Ion Channels	
(10)	Voltage Dependent Channels. Ligand Gated Channels	
(11)	Ligand Gated Channels Receptor Mediated Endocytosis.	
(12)	DNA Structure and Properties. DNA Biosynthesis. DNA Repairing.	
(13)	RNA Biosynthesis. RNA Processing. Genetic Code. Point Mutation.	**13th Week**
(14)	Protein Biosynthesis. Activation, Initiation, Elongation and Termination.	
(15)	Principles of Recombinant DNA. Protein and polypeptide production by Recombinant DNA Technology.	
(16)	Final Exam Week	

Expected workload:

I estimate it will require a minimum of 2 hours/credit hour (12 hours per week) outside class time to pass this course.

Attendance policy:

Absence from lectures shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module references

Books

Biochemistry, 5th edition, Jeremy M Berg, John L Tymoczko, and Lubert Stryer. (recomemded)

Biochemistry, Fifth Edition Mary K. Campbell, Shawn O. Farrell (recommended)

Biochemistry, Voet, D, Voet J., Fourth edition

Harpers Illustrated biochemistry, Robert K. Murray, Daryl K. Granner, Victor W. Rodwell

Journals

Journal of Biological Chemistry

European Journal of Biochemistry

Biochemistry

Websites
http://www.philadelphia.edu.jo/pharmacy/resources.html
www.jbc.org
www.febsjournal.org
http://acsinfo.acs.org
www.wiley.com/college/voet
www.prenhall.com/horton
http://thepoint.lww.com/Book/Show/3391#tab_27710