The Hashemite University

الجامعـــــــــة الهاشميـــــــــــة

Faculty of Pharmaceutical Sciences

كلية العلوم الصيدلانية

Syllabus: Biochemistry (#131702221)
Second Semester 2022 /2023

COURSE INFORMATION	
Course Name: Biochemistry **Learning method: Face-to-face learning** **Semester: Second** **Department: Clinical Pharmacy & Pharmacy Practice** **Faculty: Pharmaceutical Sciences**	**Course Code: 131702221** **Section: according to the schedule** **Core Curriculum: 2013 and 2019 Study Plan**
Day(s) and Time(s): According to HU courses timetable/semester **Classroom: As per semester (Pharmaceutical Sciences building)**	**Credit Hours:** 3 **Prerequisites: (1917013210-pharmaceutical organic chemistry 1 or 110103107 and 110108105)**

COURSE DESCRIPTION

This course aims to provide the students with the basic information about the unique physical and chemical properties for macromolecules (carbohydrate, lipids and proteins) and their function in the biological system. The use of water as a universal solvent in biological systems and the acid base properties of water will be studied. The metabolism of carbohydrate, proteins, triglycerides, cholesterol and phospholipids will also be studied. In addition, it covers the bioenergetics and oxidative phosphorylation reactions.

DELIVERY METHODS

The course will be delivered through a combination of active learning strategies. These will include:

- PowerPoint recorded lectures and active classroom-based discussion
  Students will be encouraged to participate and be actively involved in the learning process. Lectures will start with questions to inquire about the students' prior knowledge of the topic and/or about the previous lecture. Other questions will also be asked at the end of the lecture to gain insight into the students' competencies (to verify whether students have completely understood the topic).
- White board will be used to solve problems and calculations

- Relevant films and Video lectures
- E-learning resources: e-reading assignments and practice quizzes through Moodle and Microsoft Teams

FACULTY INFORMATION

Name	**1- Dr. Iman Mansi** **2- Dr. Suhad Bani Melhim**
Academic Title:	**1- Associate Professor** **2- Assistant Professor (respectively)**
Office Location:	**Third Floor (485), (408)**
Telephone Number:	**Extension: 3444** **3408**
Email Address:	**1- Iman_mansi@hu.edu.jo** **2- suhadmelhim@hu.edu.jo**
Office Hours:	***As announced per semester*** ***Please send an e-mail (as mentioned above) to meet at any other time.***

REFERENCES AND LEARNING RESOURCES

Required Textbook(s):

All compulsory weekly readings are available electronically on Moodle.

1. **Lippincott's Illustrated reviews: Biochemistry, 6th edition, Denise Ferrier, 2014.**
2. **Lehninger's principles of Biochemistry, 6th edition, Nelson D.L. and Cox M.M., 2012.**
3. **Biochemistry, 7th edition, Stryer L., 2010., ISBN:978-81-312-3266-8.**

Suggested Additional Resources:

Journals: Biochemical Journal
Journal of Biological chemistry

Useful Web Resources:

Moodle HU

Course Objectives

After course completion students will be able to:

The students are expected to :

1. Demonstrate a good awareness and understanding of biochemical principles
2. Emphasize the main concepts regarding the chemical and physical properties of biomolecules (proteins, carbohydrates and lipids)
3. Know the major functions of the biomolecules in a biological system.
4. Recognize how macromolecules are metabolized inside the body to produce energy
5. Know the main concepts of bioenergetics and oxidative phosphorylation.

Course Learning Outcomes (CLOs)

A. Knowledge and Understanding

A.1- Define biomolecules such as lipid, carbohydrate, nucleic acid or protein class in terms of chemical structure, physical properties, biological function as well as the synthesis and degradation pathway

pathway of these different biomolecules.

A.2- Extend the knowledge about metabolism and bioenergetics including the metabolic pathways, catabolism, anabolism and free energy changes; concept of high energy carriers, ATP, acetyl CoA, and co-factors NAD+, NADP+, and FAD; glycolysis, the citric acid cycle, glycogen breakdown, gluconeogenesis, fatty acid metabolism, amino acid metabolism, various types of carbohydrates, (polysaccharides) and glycoprotein.

A.3- Explain the various factors that affect enzymes mechanism, substrate binding, active site, specificity and rate of reaction, effect of temperature, pH, concentration, Michaelis-Menten, Lineweaver-Burk; enzyme inhibition: competitive, non-competitive regulation of enzymes as drug targets.

A.5- Relate the biochemical events at the cellular level to the physiological processes at human level.

B. Essential for Practice and Care (Intellectual Skills):

B1- Interpret metabolic abnormalities and relate them to possible causes and mechanisms

B2- Discuss the role of pharmaceutical supplements found as over-the counter medications such as vitamins (Vitamin B6, B12) in the metabolism of amino acids as well as the role of carnitine role in lipid metabolism.In addition to the role glycosaminoglycans found in pharmacy such as (chondroitin, heparan, keratan sulfate, hyaluronic acid) and their importance to human body .

B3-Correlate lipid metabolic pathway to cyclooxygenases and leukotrienes that are targets for anti-inflammatory medications.

C. Approach to Practice Pharmacy:

C.1- Solve problems that appears while performing experiments (Creative Thinker and Problem Solver): design and develop critical thinking and problem solving skills.

C.2- Employ effective communication skills (Communicator): interact with collegues/teachers by using verbal or written methods as well as interpersonal skills.

ACADEMIC SUPPORT

It is The Hashemite University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their instructor to ensure that their individual needs are met. The University through its Special Need section will exert all efforts to accommodate for individual's needs.

Special Needs Section:
Tel: 00962-5-3903333 , Extension: 4209
Location: Students Affairs Deanship/ Department of Student Welfare Services
Email: **amalomoush@hu.edu.jo**
amalomoush@staff.hu.edu.jo

COURSE REGULATIONS

Participation

Class participation and attendance are important elements of every student's learning experience at The Hashemite University, and the student is expected to attend all classes. A student should not miss more than 15% of the classes during a semester. *Those exceeding this limit of 15% will receive a failing grade regardless of their performance*. It is a student's responsibility to monitor the frequency of their own absences. **Attendance record begins on the first day of class irrespective of the period allotted to drop/add and late registration. It is a student's responsibility to sign-in; failure to do so will result in a non-attendance being recorded.**

In exceptional cases, the student, with the instructor's prior permission, could be exempted from attending a class provided that the number of such occasions does not exceed the limit allowed by the University. The instructor will determine the acceptability of an absence for being absent. A student who misses more than 25% of classes and has a valid excuse for being absent will be allowed to withdraw from the course.

On average, students need to spend 2 hrs of study and preparation weekly. At the beginning of the lectures, be on time and don't leave before the end of the lecture without an accepted excuse. **If you missed a class, it is your responsibility to find out about any announcements or assignments you have missed.** For any clarification, please communicate your instructor at her posted office hours or by appointment. Listen well to the lecture, if you have a question, ask your instructor. You will find the course material at the course team after the lecture.

Sharing of course materials is forbidden. No course material including, but not limited to, course outline, lecture hand-outs, videos, exams, and assignments may be shared online or with anyone outside the class. Any suspected unauthorized sharing of materials, will be reported to the university's Legal Affairs Office. If a student violates this restriction, it could lead to student misconduct procedures.

Plagiarism

Plagiarism is considered a serious academic offence and can result in your work losing marks or being failed. HU expects its students to adopt and abide by the highest standards of conduct in their interaction with their professors, peers, and the wider University community. As such, a student is

expected not to engage in behaviours that compromise his/her own integrity as well as that of The Hashemite University.

Plagiarism includes the following examples, and it applies to all student assignments or submitted work:

- **Use of the work, ideas, images, or words of someone else without his/her permission or reference to them.**
- **Use of someone else's wording, name, phrase, sentence, paragraph or essay without using quotation marks.**
- **Misrepresentation of the sources that were used.**

The instructor has the right to fail the coursework or deduct marks where plagiarism is detected

Late or Missed Assignments

In all cases of assessment, students who fails to attend an exam, class project or deliver a presentation on the scheduled date without prior permission, and/or are unable to provide a medical note, will automatically receive a fail grade for this part of the assessment.

- Submitting a term paper on time is a key part of the assessment process. Students who fail to submit their work by the deadline specified will automatically receive a 10% penalty. Assignments handed in more than 24 hours late will receive a further 10% penalty. Each subsequent 24 hours will result in a further 10% penalty.
- In cases where a student misses an assessment on account of a medical reason or with prior permission; in line with University regulations an incomplete grade for the specific assessment will be awarded and an alternative assessment or extension can be arranged.

Missed Assessments

In all cases of assessment, students who fails to attend an exam on the scheduled date without prior permission, and/or are unable to provide a medical note, will automatically receive a failure grade **.**for this part of the assessment

• In cases where a student misses an assessment on account of a medical reason or with prior permission; in line with university regulations an incomplete grade for the specific assessment will be awarded and an alternative assessment or extension can be arranged.

Cheating

Cheating, academic disconduct, fabrication and plagiarism will not be tolerated, and the university policy will be applied. Cheating policy: The participation, the commitment of cheating will lead to applying all following penalties together:

- Failing the subject, he/she cheated at
- Failing the other subjects taken in the same course
- Not allowed to register for the next semester
- The summer semester is not considered as a semester

Student Complaints Policy

Students at The Hashemite University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

COURSE ASSESSMENT

Course Calendar and Assessment

Students will be graded through the following means of assessment:

Course Assessment Plan					
Assessment	**Grade Weighting**	**Deadline Assessment**	**CILOs**		
First exam	25%	~ 6th week	A	B	C
Second Exam	25%	~ 10th week	A	B	C
Quizzes	10%	During the semester	A	B	C
Final Exam	40%	~ 15th /16th week	A	B	C

Students will be graded through the following means of assessment and their final grade will be calculated from the forms of assessment as listed below with their grade weighting taken into account. The criteria for grading are listed at the end of the syllabus

Students will be graded through the following means of assessment:

Description of Exams
Test questions will predominately come from material presented in the lectures and the lectures themselves. Semester exams may be conducted during the regularly scheduled lecture period. Exam may consist of a combination of multiple choice, short answer, match, true and false, and/or descriptive questions.

Quizzes: Unannounced quizzes will be given during or/and at the end of each chapter based upon the previous lectures. It will enforce that you come prepared to the class.

No make-up exams, homework or quizzes will be given. Only documented absences will be considered as per HU guidelines. Make-up exams may be different from regular exams in content and format.

Grades are not negotiable and are awarded according to the following criteria:

Letter Grade	Description	Grade Points
A+	Excellent	4.00
A		3.75
A-		3.50
B+	Very Good	3.25
B		3.00
B-		2.75
C+	Good	2.50
C		2.25
C-		2.00

D+	Pass	1.75
D	Pass	1.50
F	Fail	0.00
I	Incomplete	-

WEEKLY LECTURE SCHEDULE AND CONTENT DISTRIBUTION

Lecture hours and weeks are approximate and may change as needed"

Note: The course is provided as 2 lecture per week (Sunday/Tuesday, Monday/Wednesday), one lecture period covers 1.5 lecture hours (75 minutes). The course content specifies chapters of the textbook that will be included in exams. **All lectures are delivered by face-to-face learning.**

Course Content					
Week Number	**No. of Hours /lectures**	**CILOs**	**Subject**	**Delivery Methods**	**Assessment Methods**
1	**3 hours (lectures 1-2)**	A	**Introduction and course outline**	Active Classroom-Based Discussions PowerPoint Lectures	-
2	**1.5 hours (Lecture 3)**	A	**Water and pH**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
2-3	**4.5 (Lectures 4 ,5,6)**	A, B, C	**Amino Acids and Peptides**	PowerPoint Lectures Active Classroom-Based Discussions	Exams Quizzes
4	**3 hours (Lectures 6 ,7)**	A, B, C	**Globular proteins**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
5	**1.5 (Lecture 8)**	A, B, C	**Fibrous proteins**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
5-6	**3 hours (Lecture 9, 10)**	A, B, C	**Enzymes and enzyme kinetics**	PowerPoint Lectures Active Classroom-Based Discussions	Exams Quizzes
First exam, week 6					
7	**1.5** **0.5** **0.5** **0.5**	A, B, C	**Biochemistry of Carbohydrates** **Biochemistry of Lipids** **Biological Membranes (plasma membrane).**	PowerPoint Lectures Active Classroom-Based Discussions Active Classroom-Based Discussions	Exams

	(Lecture 11)				
7-8	**2 hours** **(Lecture 12,13)**	A, B, C	**Glycosaminoglycans and Glycoproteins.**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
8-10	**4 hours (Lectures 13, 14,15)**	A, B, C	**Metabolism of glucose (Glycolysis and TCA cycle, gluconeogenesis).**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
Second exam, week 10					
11	**1.5 hours** **(Lecture 16)**	A, B, C	**Metabolism of mono and disaccharides- fructose/galactose**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
11	**1.5 hours (Lecture 17)**	A, B, C	**Pentose phosphate pathway and NADPH.**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
12	**1.5 hours (Lecture 18)**	A, B, C	**Glycogenesis and glycogenolysis**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
12-13	**3 hours (Lectures 19, 20)**	A, B, C	**Metabolism of protein and urea cycle**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
13	**1.5 hours** **(Lecture 21)**	A, B, C	**Metabolism of fatty acids**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
13-14	**3 hours (Lectures 22, 23)**	A, B, C	**Metabolism of phospholipids and cholesterol**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
14	**1.5 hours (Lecture 24)**	A, B, C	**Integration of metabolism** **Bioenergetics and oxidative phosphorylation**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
Final Exam, week 15					