Medicinal Chemistry (1) (#1917031323)
Second Semester 2023 /2024

COURSE INFORMATION	
Course Name: Medicinal chemistry (1) **Learning method:** Hybrid learning **Semester:** Second **Department:** Pharmaceutical chemistry **Faculty:** Pharmaceutical Sciences	**Course Code:** 1917031323 **Section:** As per semester **Core Curriculum**: 2019 Study Plan **JNQF Level:** 7
Day(s) and Time(s): According to HU courses timetable/semester **Classroom:** As per semester **Date prepared:** January 2020 **Date updated:** February 2024	**Credit Hours:** 3 **Prerequisites**: 1917031211 (Pharmaceutical organic chemistry 2)

COURSE DESCRIPTION

This course explains the effects of drug structure and physicochemical properties on its pharmacokinetics ADME (Absorption, Distribution, Metabolism and Excretion), pharmacodynamics (reaction of drug with its receptor), and metabolism (phase I (oxidative, reductive, and hydrolytic biotransformation) and phase II (conjugation). Prodrugs will also be discussed. In addition, the structure activity relationship of the different drug classes including autonomic nervous system, cardiovascular system, antiasthmatic and antiallergic drugs, drugs used in gastric ulcer and hormone therapy and the effect of chemical modification on the efficacy and the physicochemical properties of these classes of drugs.

DELIVERY METHODS

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

- PowerPoint lectures and active classroom-based discussion (70%)
  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. These questions will also be repeated at the end of the lecture to gain insight into the students' competences (to verify whether students have understood the topic). While delivering the lecture presentation, time will be given to allow students to reflect about what they have learnt and think in and discuss some examples of short case studies.
- Recorded lectures (30%)
  Part of the course will be given as recorded lectures through Microsoft Team.

FACULTY INFORMATION

Name	**Dr Asma Fakhoury**	**Dr Rand Shahin**
Academic Title:	**Assistant Professor**	**Associate professor**
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Telephone Number:	**Extension: 3434**	**Extension: 3442**
Email Address:	**a.fakhoury@hu.edu.jo**	**r.shahin@hu.edu.jo**
Office Hours:	**As announced per semester** ***Please send an e-mail to meet at any other time.***	

REFERENCES AND LEARNING RESOURCES

Required Textbook(s):.

1. Introduction to Medicinal Chemistry, Graham Patrick**,** 4th edition, 2009, Oxford University Press.

Suggested Additional Resources:

1. Wilson and Gisvold's Textbook of Organic, Medicinal and Pharmaceutical Chemistry, 11th Edition, 2004, Lea & Febiger

Useful Web Resources:

As per each lecture.

COURSE OBJECTIVES

The objectives of this course are:

1. Understand the main theoretical concepts in medicinal chemistry
2. Understand how and why certain chemicals interact at biological targets and how structural changes alter the properties of bioactive molecules.
3. Familiarize students with the structure-activity relationships of different drug classes.

COURSE INTENDED LEARNING OUTCOMES (CILOs)

A. Foundational Knowledge

At the end of the course, students are expected to:

A1. Understand the drug development process, including how biologically active drugs are synthesized, how the structure of a drug relates to its activity at the molecular level, and how basic research into the biochemical mechanism of disease leads to the targeted development of drugs.

A2. Understand the influence of the physico-chemical properties of a drug on its absorption, distribution and elimination and the effect of chemical modification on these characteristics.

A3. Relate the structure of different drug classes to their activity (structure activity relation)

B. Essentials for Practice and Care

B1. Discuss problems with other colleagues.

B2. Apply knowledge gained in medicinal chemistry in other taught courses to provide better patient care.

B3. Analyze binding interactions between drugs and their target's binding pocket and how certain interactions would affect the activity of the drug.

C. Approach to Practice and Care

When students complete the course, they will be able to:

C1. Critically assess primary and secondary literature in the area of medicinal chemistry.

C2. Use certain specialized concepts in medicinal chemistry, such as pharmacophore and QSAR when interacting with an individual, group, or organization.

D. Personal and Professional Development

D1. Relate gained knowledge, skills and abilities on their role as medication experts and health care providers to provide effective dose regimens.

D2. Integrate in innovative activities using creative thinking to envision better ways of accomplishing professional goals

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 6 hrs of study and preparation weekly. At the beginning of the lectures, students should be on time and should not leave before the end of the lecture without an accepted excuse. **If the student missed a class, it is his/her responsibility to find out about any announcements or assignments they have missed.** For any clarification, students should communicate with their instructor at her posted office hours or by appointment. Students should listen well to the lecture, if anyone has a question, he/she should ask the instructor. Students can find the course material at the course Microsoft team/Model 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.

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			
			A	B	C	D
First Exam	30%	~ 6th week	A	B	C	D
Second Exam	30%	~ 10th week	A	B	C	D
Quizzes/ Homework/ Assignments /Projects	0%	-	-	-	-	-
Final Exam	40%	~ 15th /16th week	A	B	C	D

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.

No make-up exams 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: For the 2 lecture periods per week (S/T, M/W), one lecture period covers 1.5 lecture hours (75 minutes). The course content specifies chapters of the textbook that will be included in exams.

70% of lectures are delivered by face-to-face learning and 30% are delivered through Microsoft Teams.

Course Content					
Week Number	**No. of Hours**	**CILOs**	**Subject**	**Delivery Methods**	**Assessment Methods**
1	**1.5**	A1 B1, B2 C1 D1, D2	**Course outline and Introduction to Medicinal Chemistry**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
1	**1.5**	A1 B1, B2 C1 D1, D2	**Drug targets** Drug target and receptors Drug target interaction Chemical bonding and biological activity Stereochemical aspects of drug action (isosterism and bioisosterism)	PowerPoint Lectures Active Classroom-Based Discussions	Exams
2-3	**6**	A1 B1, B2 C1 D1, D2	**Drug Absorption and Distribution** Biomembranes Mechanisms of drug absorption Physicochemical properties of drugs Drug distribution	PowerPoint Lectures Active Classroom-Based Discussions	Exams
4-5	**4.5** 1 2 1.5	A1 B1, B2 C1 D1, D2	**Drug Metabolism** First pass effect Metabolic changes of drugs Role of cytochrome P450 Phase I metabolism (Oxidation and reduction of different functional groups and hydrolysis) Prodrugs concept	PowerPoint Lectures Active Classroom-Based Discussions	Exams
5	**1.5**	A1-3 B1-3 C1,C2 D1, D2	Phase II drug metabolism Glucouronic acid, sulphate glycine, glutamine and glutathione conjugation Acetylation and methylation Factors affecting drug	PowerPoint Lectures Active Classroom-Based Discussions	Exams

			metabolism		
6-7	**6** 3 3	A1-3 B1-3 C1,C2 D1, D2	**Autonomic nervous system** Cholinergic agonists and antagonists AChE Inhibitors	PowerPoint Lectures Active Classroom-Based Discussions	Exams
8	**3**	A1-3 B1-3 C1,C2 D1, D2	**Adrenergic agonist and antagonists**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
9	**3**	A1-3 B1-3 C2 C1, D1, D2	**Antihypertensives and antiangina**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
10	**3**	A1-3 B1-3 C1,C2 D1, D2	**Diuretics**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
11	**3**	A1-3 B1-3 C1,C2 D1, D2	**Antihyperlipidemic agents**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
12-13	**4.5**	A1-3 B1-3 C1,C2 D1, D2	**Antihistamines** Allergy and gastrointestinal drugs	PowerPoint Lectures Active Classroom-Based Discussions	Exams
13-14	**3**	A1-3 B1-3 C1,C2 D1, D2	**Hormones**	PowerPoint Lectures Active Classroom-Based Discussions	Exams
15	**-**		**University Final Exams**		