



Syllabus: Medicinal Chemistry 1 (#1917031323) Second Semester 2021 /2022

COURSE INFORMATION

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| Course Name: Medicinal Chemistry 1 (dual face-to-face and online education) Semester: Second Department: pharmaceutical chemistry Faculty: Pharmaceutical Sciences | Course Code: 1917031323 Section: 1 and 2 Core Curriculum: 2013 Study Plan |
| Day(s) and Time(s): Sun + Tues: 8:00 – 9:30 Mon + Wed: 9:00-10:30 Classroom: To be announced | Credit Hours: 3 Prerequisites: 1917031211 |

COURSE DESCRIPTION

This course guides the pharmacy student towards understanding the effect of a drug's structure and physicochemical properties on pharmacokinetics ADME (Absorption, Distribution, Metabolism and Excretion), pharmacodynamics (reaction of drug with its receptor), and drug metabolism (phase I (oxidative, reductive, and hydrolytic biotransformation) and phase II (conjugation). Prodrugs also will be discussed. In addition, this course teaches the pharmacy student about 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 groups of compounds

DELIVERY METHODS

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

- PowerPoint lectures and active classroom-based discussion
- Teams recorded lectures
- Relevant films and documentaries
- E-learning resources: e-reading assignments and practice quizzes through Model and Microsoft Team

FACULTY INFORMATION

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| Name | Dr. Rand Shahin |
| Academic Title: | Assistant Professor |
| Office Location: | Third Floor |
| Telephone Number: | Extension: 3442 |
| Email Address: | r.shahin@hu.edu.jo |
| Office Hours: | Monday 10:30-1:00 Tuesday 10:00-11:00 <i>Please send an e-mail (r.shahin@hu.edu.jo) to meet.</i> |

REFERENCES AND LEARNING RESOURCES

Required Textbook(s):

- 1. Introduction to Medicinal Chemistry, Graham Patrick, 4th edition, 2009, Oxford (textbook) 1 University Press*
- 2. Wilson and Gisvold's Textbook of Organic, Medicinal and Pharmaceutical Chemistry, 11th Edition, 2004, Lea & Febiger*

STUDENT LEARNING OUTCOMES MATRIX

An alignment matrix of the **program** ILOs of the Bachelor of 'Pharmaceutical Sciences at The Hashemite University, the **course** ILOs and knowledge, skills and competencies as mentioned in the Jordan National Qualifications Framework (JNQF)

| Field according to (JNQF) | Required to achieve (according to (JNQF)) | Core curriculum learning outcomes | B.Sc. Pharmacy Program ILOs | Course Objectives | Course Student ILOs | | | | Assessment Method |
|---------------------------|--|---|-----------------------------------|-------------------|---------------------|---|---|---|---|
| | | | | | A | B | C | D | |
| Knowledge | <p>A. Knowledge and Understanding: When students have completed the course, they will be able to</p> <p>A1. Gain an appreciation for the drug development process, including how biologically active drugs are synthesized, how the structure of a drug relates to its activity, and how basic research into the biochemical mechanism of disease leads to the targeted development of drugs</p> <p>A2. Learn 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</p> <p>A3. Understand the chemical basis of drug action at molecular level and drug metabolism.</p> <p>A4. To understand the concept of synthetic lead in the design of drugs</p> <p>A5. To learn the structure activity relationship of the different drug classes</p> | Foundational Knowledge | Learner | | | | | | Power point presentation and class discussion |
| | | | | | | | | | |
| Skills | <p>Essential for Practice and Care (Intellectual Skills):</p> <p>B1-The student will be able to explain the structure activity relationship of various drug classes, to discuss problems with others, to communicate with his colleagues and analyze different subjects</p> <p>B2. The student will be able to provide patient-centered care as the medication based on his medicinal chemistry knowledge and experience</p> <p>Approach to Practice Pharmacy: When students have completed the course, they will be able to:</p> | Essentials for Practice and Care Approach to Practice and Care | Caregiver | | | | | | Problem solving during exams and examples during class discussion |
| | | | Manager | | | | | | |
| | | | Promoter | | | | | | |
| | | | Provider | | | | | | |
| | | | Creative Thinker & Problem-Solver | | | | | | |
| | | | Educator | | | | | | |
| | | | Advocate | | | | | | |
| | | | Collaborator | | | | | | |

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|--------------|--|---|---|--|--|--|--|--|--|--|--|
| | <p>C1. Critically assess primary and secondary literature in the area of medicinal chemistry.</p> <p>C2 Be aware of the social and ethical issues that arise in medicinal chemistry.</p> <p>C3. Student will be able to use certain specialized concepts in medicinal chemistry such as pharmacophore and QSAR</p> | | <p>Includer</p> <p>Communicator</p> | | | | | | | | |
| Competencies | <p>D1 Self-awareness (Self-aware) – Examine and reflect on personal knowledge, skills, abilities, beliefs, biases, motivation, and emotions that could enhance or limit personal and professional growth regarding his role as a pharmacist and the medication expert and health care providers regarding the effective dose regimens</p> | <p>Personal & Professional Development</p> <p>Pharmaceutical Product Expert</p> | <p>Self-aware</p> | | | | | | | | <p>Problem solving during exams and examples during class discussion</p> |
| | | | <p>Leader</p> | | | | | | | | |
| | <p>D2. Professionalism (Professional) - Exhibit behaviors and values that are consistent with the trust</p> | | <p>Innovator</p> | | | | | | | | |
| | | | <p>Professional</p> <p>Manufacturer</p> | | | | | | | | |

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 15 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.

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 misconduct, 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 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:

| Assessment | Grade Weighting | Deadline Assessment |
|-------------|-----------------|---|
| First Exam | 30% | ~ 6 th week |
| Second Exam | 30% | ~ 10 th week |
| Final Exam | 40% | ~ 15 th /16 th week |

Description of Exams

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

Homework: Will be given for each chapter, while the chapter in progress you are supposed to work on them continuously and submit in next lecture when I finish the chapter.

You are also expected to work on in-chapter examples, self-tests and representative number of end of chapter problems. The answers of self-tests and end of chapter exercises are given at the end of the book.

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.

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”

| Course Contents | | | | | | |
|---|--|------------------------------|-------------------------------|------------------------------------|------------------------|------------|
| Topics | Topic Details | ILOs | Reference No. and Chapter | Teaching Procedure | Estimated no. of hours | Assessment |
| Introduction to Medicinal Chemistry. | What is Medicinal Chemistry? Classification of Drugs | A1-4 B1-3 | 2, Chapter 1 | Lecturing, Active and Online | | First exam |
| Drug targets | Where do drugs work? Drug targets and receptors Drug-target interaction Chemical bonding and biological activity Stereochemical aspects of drug action (Isosterism and bioisosterism) | A1-4 B1-3 | 1 , PART A Drug targets | Lecturing, Active and Online | | First exam |
| Drug Absorption and Distribution | Biomembranes Mechanisms of Drug Absorption Physicochemical Properties of Drugs Drug Distribution | A1-4 B1-3 C1-3 D1-3 | 2, Chapter 2 | Lecturing, Active and Online | | First exam |
| Drug Metabolism | First pass effect, metabolic changes of drugs, role of cytochrome P450 Phase I Oxidation of different functional groups | A1-4 B1-3 C1-3 D1-3 | 2 Chapter 3 | Lecturing, Active and Online | | First exam |

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|--|--|------------------------------|---|------------------------------------|--|----------------------|
| | Reduction and hydrolysis Prodrug concept | | | | | |
| Phase II drug metabolism | Glucuronic acid, sulphate, glycine, glutamine, and glutathione conjugation Acetylation and methylation Factors affecting drug metabolism | A1-4 B1-3 C1-3 D1-3 | 2 Chapter 3 | Lecturing, Active and Online | | 1 st exam |
| Autonomic nervous system | Cholinergic agonists and antagonist | A1-4 B1-3 C1-3 D1-3 | 2 Chapter 17 | Lecturing, Active and Online | | Second exam |
| Autonomic nervous system | AChE inhibitors | A1-4 B1-3 C1-3 D1-3 | Ref 1: Chapter 22, Ref 2: Chapter 17 | Lecturing, Active and Online | | Second exam |
| Adrenergic agonists and antagonists | Adrenergic agonists and antagonists | A1-4 B1-3 C1-3 D1-3 | Ref 1: Chapt. 23 Ref 2: Chapt. 16 | Lecturing, Active and Online | | Second exam |
| Antihypertensive and antiangina | A brief about antihypertensive and antiangina | A1-4 B1-3 C1-3 D1-3 | 1 and 2 Ref 1: Chapt. 23 Ref 2: Chapt. 19 | Lecturing, Active and Online | | Second exam |
| Diuretic | A brief about major diuretic drugs concepts | A1-4 B1-3 C1-3 D1-3 | 2, Chapter 18 | Lecturing, Active and Online | | 2 nd exam |
| Antihyperlipidemic | A brief about Antihyperlipidemic | A1-4 B1-3 C1-3 D1-3 | 2, Chapter 19 | Lecturing, Active and Online | | Final exam |
| Anti histamines | A brief about Anti histamines (allergy and Gastrointestinal drugs) | A1-4 B1-3 C1-3 D1-3 | 2, Chapter 23 | Lecturing, Active and Online | | Final exam |
| Hormones | Corticosteroids and hormones | A1-4 B1-3 C1-3 D1-3 | 2, Chapter 25 | Lecturing, Active and Online | | Final exam |
| | Final Examinations | | | | | |

Last updated on 20/ 3/ 2022 by : Dr. Rand Omar Shahin