# Syllabus: Pharmaceutical Organic Chemistry II (#1917031211)
# First Semester 2022/2023

| COURSE INFORMATION | |
|---|---|
| **Course Name: Pharmaceutical Organic Chemistry II**<br>**Learning method: face-to-face learning**<br>**Semester: Second**<br>**Department: Pharmaceutical Chemistry**<br>**Faculty: Pharmaceutical Sciences** | **Course Code: 1917031211**<br>**Section: As per semester**<br>**Core Curriculum: 2019**<br>**Study Plan**<br>**JNQF Level: 7** |
| **Day(s) and Time(s): According to HU courses timetable/semester**<br><br>**Classroom: As per semester**<br>**Date prepared :Jan 2020 Date uploaded:Feb 2024** | **Credit Hours: 2**<br>**Prerequisites: 1917031210** |

## COURSE DESCRIPTION

**Pharmaceutical Organic Chemistry II course is a continuation of Pharmaceutical Organic Chemistry I course and it covers knowledge of heterocyclic organic compounds (The nomenclature, natural sources, The general synthetic procedures).**
**Also it covers examples of important classes of heterocyclic aromatic compounds involving one or more heteroatoms (their structures, chemical and physical properties, their synthetic pathway, their chemical reaction, their presence as part of natural and pharmaceutical compounds.**

## DELIVERY METHODS

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

- PowerPoint 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. These questions will also be repeated at the end of the lecture to gain insight into the students' competencies (to verify whether students have understood the topic). During delivering the lecture presentation, time will be given to allow students to reflect about what they have learned and think in and discuss some examples of short case studies.
- Relevant short videos on you tube
- E-learning resources: e-reading assignments and homework through Model and Microsoft Team

## FACULTY INFORMATION

| | |
|---|---|
| **Name** | **Dr. Lubna Swellmeen** |
| **Academic Title:** | **Assistant Professor** |
| **Office Location:** | **Third Floor(A420)** |
| **Telephone Number:** | **Extension: 3433** |
| **Email Address:** | **lubnam@hu.edu.jo** |
| **Office Hours:** | **As announced per semester**<br>***Please send an e-mail (lubnam@hu.edu.jo) to meet at any other time.*** |

## REFERENCES AND LEARNING RESOURCES

Required Textbook(s ):.

Louis D Quin (**July 2019):** Fundamentals Of Heterocyclic Chemistry Importance In Nature And In The Synthesis Of Pharmaceuticals. **1st Ed**, Wiley India

Suggested Additional Resources:

1- Louis D. Quin and John A. Tyrell (2010): Fundamental of Heterocyclic Chemistry Importance in Nature and in the Synthesis of Pharmaceuticals. 1st Ed. A John Wiley & Sons, Ltd., Publication. England

2. Sarker S.D. and Nahar L. (2007): Chemistry for Pharmacy Students, General, Organic and Natural Product Chemistry. 1st Ed. A John Wiley & Sons, Ltd., Publication. England.

3. Paul M. Dewick (2006): Essentials of Organic Chemistry. For Students of Pharmacy, Medicinal Chemistry and Biological Chemistry. 1st Ed. A John Wiley & Sons, Ltd., Publication. England.

4. John A. Joule and Keith Mills (2010): Heterocyclic Chemistry. 5th Ed. A John Wiley & Sons, Ltd., Publication. England.

Useful Web Resources:

As per each lecture.

## Course Objectives

**By the end of the course the students should be able to:**

1. Have a broad and deep knowledge about the fundamental principles of aromatic compounds and give examples such a five and six membered ring system, saturated and unsaturated system, nucleic acids, and carbohydrates
2. Recognize the most important aromatic heterocyclic chemical.
3. Name the heterocyclic compounds by common and systematic (IUPAC) nomenclatures
4. Understand the reactions and mechanism of the reactions for the synthesis of aromatic heterocyclic compound.
5. know the most important aromatic heterocyclic systems, their physical and chemical properties, specific reactions for synthesis, the chemical reactions they can be involved in and their existence in nature and drugs.

## Course Learning Outcomes (CLOs)

**A. Knowledge Transfer**:

Upon completion of the course, the student should be able to:

A-1 Name according to IUPAC rules a heterocyclic compounds.

A-2 Understand the chemistry, reactions and structures of heterocyclic compounds.

A-3 Outline the appropriate chemical equations for the preparation of certain heterocyclic compounds.

A-4 Demonstrate knowledge and understanding of the medicinal reactivity of different heterocyclic compounds.

**B. Intellectual Skills:**

When students have completed the program they will be able to:

B-1 Communicate matters of pharmaceutical organic chemistry with clarity. Attainment of this learning outcome will be reflected by the student's ability to: Complete successfully written and oral assignments and examinations.

B-2 Combine and apply different reactions mechanisms with practical work.

B-3 Assign names of heterocyclic compounds.

B-4 Completely perform practical work in organic laboratory.

B-5 Conduct further study and researchers in the field of organic, natural product, medicinal chemistry, biochemistry and biomedicinal sciences.

**C. Approach to Practice:**

When students have completed the program, they will be able to:

C-1 Students will be encouraged to read widely and to research the various topics using the assigned texts, libraries and relevant web sites

C-2 The use of other information resources is essential if students are to gain maximum benefit from their studies.

C-3 This approach to the subject is in part designed to encourage students to be more responsible for their own learning and to become life long learners

**D. Personal and Professional Development**:

When students have completed the program they will be able to:

D-1 Develop of problem-solving and critical thinking skills.

D-2 Use of videos and animation to effectively understand the concepts.

D-3 ableto use a simple word and IT skills (i.e., data processing, software, internet, and multimedia) and the library to find information.

D-4 able to be self-motivated learners and responsive to feedback.

| |
|---|
| D-5 Work in a team (i.e., sharing presentations and discussions and solving problems). |

## 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, 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 him/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 | 25% | ~ 10th week | A | B | C | D |
| Quizzes/ Homework/ Assignments /Projects | 5% | ~ 3th week – ~ 8th week - | A | B | C | D |
| 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.

**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 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.

**All lectures are delivered by face-to-face learning.**

***Course Content***

| Week Number | No. of Hours | CILOs | Subject | Delivery Methods | Assessment Methods |
|---|---|---|---|---|---|
| **1** | **2** | A1-A4<br>B1-B4<br>C1-C3 | ***Introduction*** **Introduction to Organic Chemistry II & the Course Outline** | PowerPoint Lecture<br>Active Classroom-Based Discussions | Exams |
| **2-3** | **4** | A1-A4<br>B1-B4<br>C1-C3 | **The scope of the field of heterocyclic chemistry** | PowerPoint Lecture<br>Active Classroom-Based Discussions | Exams |
| **4** | **2** | A1-A4<br>B1-B4<br>C1-C3 | **Common ring systems and the naming of heterocyclic compounds**<br>• Structure, Nomenclature,<br>• Properties, Sources | PowerPoint Lectures<br>Active Classroom-Based Discussions | Exams |
| **5** | **2** | A1-A4<br>B1-B4 | **Nature as a source of Heterocyclic compounds**<br>• | PowerPoint Lecture<br>Active Classroom-Based Discussions | Exams |

| | | | | | |
|---|---|---|---|---|---|
| | | C1-C3 | | | |
| **6-8** | **6** | A1-A4<br><br>B1-B4<br><br>C1-C3<br>D1-D5 | **Principles of synthesis of aromatic heterocycles by intramolecular cyclization** | PowerPoint Lecture<br><br>Active Classroom-Based Discussions | Exams |
| 9-10 | 4 | A1-A4<br>B1-B4<br>C1-C3 | **Aromaticity and other special proper heterocycles:**<br>• PI-Excessive ring sy mesoionic ring systems<br>• Nomenclature, Properties Preparation, and Reactions | PowerPoint Lecture | |
| 11-12 | 4 | A1-A4<br>B1-B4<br>C1-C3 | **Aromaticity and other special proper Heterocycles**<br>• PI- Deficient ring systems mesoionic ring system<br>• Structures<br>• Nomenclature, Properties<br>• Preparation and reactions | | |

| | | | | | |
|---|---|---|---|---|---|
| 13 | 2 | A1-A4<br>B1-B4<br>C1-C3 | **The importance of heterocycles in medicine** | | |
| 14 | 2 | A1-A4<br>B1-B4<br>C1-C3 | **Synthetic methods for some prominent heterocyclic families: Example of pharmaceuticals synthesis** | | |
| 15 | 2 | A1-A4<br>B1-B4<br>C1-C3 | **Geometric and stereochemical aspects of nonaromatic heterocycles** | | |
| 16 | | | **University Final Exams** | | |