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| **1** | **Course title** | ***Pharmaceutical Organic Chemistry*** |
| **2** | **Course number** | 1201215 |
| **3** | **Credit hours** | 3 (theory) |
| **Contact hours (theory, practical)** | 48 theoretical hrs. including exams  |
| **4** | **Prerequisites/corequisites** | 0303231 |
| **5** | **Program title** | BSc. Pharmacy  |
| **6** | **Program code** | 1201427 |
| **7** | **Awarding institution**  | The University of Jordan |
| **8** | **School** | Pharmacy |
| **9** | **Department** | Pharmaceutical Sciences |
| **10** | **Level of course**  | Undergraduate |
| **11** | **Year of study and semester (s)** | First semester of the 2nd year |
| **12** | **Final Qualification** | BSc. Pharmacy |
| **13** | **Other department (s) involved in teaching the course** | None |
| **14** | **Language of Instruction** | English |
| **15** | **Teaching methodology** | [ ] Blended [x] Online |
| **16** | **Electronic platform(s)** | [ ] Moodle [x] Microsoft Teams [ ] Skype [x] Zoom [ ] Others………… |
| **17** | **Date of production/revision** | 28/09/2021 |

**18 Course Coordinator:**

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| Dr. Jehad AlmalitiOffice 211Phone 5 355 000, Ext. 23321.E-mail: aburjai@ju.edu.joOffice hours: Sun & Tues 10-11, 1-2 AM; Mon &Wed 10-11 AM |

**19 Other instructors:**

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| Name: **Dr. Ali Al-Qaisi**Office number:Phone number:Email:Name:Office number:Phone number:Email: |

**20 Course Description:**

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| This course will cover the different organic functional groups carried by organic compounds and drugs, heterocycles and polycyclic compounds focusing on the biological rule of these functional groups/nuclei in the structural formula of drugs. The topics will include the physical and chemical properties, chemical reactions, methods of preparation and mechanisms including pharmaceutical compound. Additionally, the course will confer the stereo-chemical aspects of these systems focusing on their effect on drugs activities. |

**21 Course aims and outcomes:**

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| A- Aims:1. To provide students with the significance of different functional groups in organic compounds, and the importance of these functional groups in the structural formula of drugs.
2. Students should understand the chemical and physical behavior and synthetic reactions of different functional groups and their significance in pharmacy.
3. To illustrating different chemical reactions, methods of preparation and mechanisms for the different classes of organic compounds.
4. Introducing more advanced topics in pharmaceutical organic chemistry such as Medicinal Chemistry, Analytical Chemistry and SARS.
5. Provide students with the importance of the different organic nuclei from which most of the drugs consist, (Heterocyclic compounds and poly-cyclic compounds).
6. Students should understand the chemical and physical behavior of heteroaromatics (**п** -deficient and **п**-excessive systems) and their importance in pharmacy.
7. Student will be able to understand the importance of stereo-chemical aspects and their relationships with drugs activities

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course, students will be able to:1. **Student should be able to** understand the physical and chemical properties of functional groups, heterocycles and polycyclic compounds and their stereo-chemical aspects.
2. **Student should be able to** comprehend the biological role of these systems in organic and pharmaceutical compounds
3. **Students must be able to** generally define and recognize different functional groups, hetero/polycyclic systems and apply this knowledge in preparing some usefully pharmaceutical chemicals, compounds and simple drugs including stero-isomers. Furthermore, he should apply his knowledge in analysis of drugs/compounds.
4. Student must be able to further apply this knowledge to explain drug behavior, solubility, oxidation, and stability. He should be also able to understand the role of these groups/systems upon binding of a drug to his biological receptors (SARS).
5. Students should acquire good theoretical skills regarding chemical and physical identification and classification of these basic organic functional groups, polycyclic and heterocyclic systems based on their chemical and physical behavior.
6. Apply his knowledge in synthesis simple drugs and organic compounds through knowledge gained within lectures and assignments, and to utilizing the concept of functional groups incorporation, heteroatom and stereochemistry in pharmaceutical drugs as tools for improving the biological activity
7. **Students should be able to wo**rk within a team to fulfill course library requirements, and to share, discuss and express ideas while working in group discussion sessions.
8. The course shall allow students of gaining some electronic and internet experience while answering some problems through visiting selected web sites related to organic chemistry and preparing assignments using internet, and PC software like drawing software.
9. Develop problem solving experience while attempting finding solutions (method of preparation) for certain pharmaceutically usefully organic compounds**.**
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**22. Topic Outline and Schedule:**

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| Topic | Week | Instructor | Achieved ILOs | Evaluation Methods | Reference |
| **1- Organic Functional groups** |  | Dr Jehad Almaliti |  |  |  |
| \*Alcohols and phenols  | 1-2  | Dr Jehad Almaliti | 1-2, 3, 5 | Exams, Quizzes | 1,2,3 |
| \*Ethers Epoxides and Organo-Sulphur compounds | 3  | Dr Jehad Almaliti | 1-2, 3, 5 | Exams, Quizzes | 1,2 |
| ***Short Quiz 1 :***  | ***3*** | Dr Jehad Almaliti | Informative quiz 3-9 | Problem solving, internet based questions |  |
| \*Aldehydes and Ketones | 3 | Dr Jehad Almaliti | 1-2, 3, 5 | Exams, Quizzes | 1,3 |
| \*Carboxylic Acids and Derivatives. | 4  | Dr Jehad Almaliti | 1-2, 3, 4, 5 | Exams, Quizzes | 1,2,3 |
| ***Midterm Exam*** | ***5*** | Dr Jehad Almaliti |  |  |  |
| \*Amino and Nitro Compounds | 6 | Dr Jehad Almaliti | 1-2, 3, 4, 5 | Exams, Quizzes, assignments | 1,3 |
| ***Assignment 1/*** ***Major Quiz :***  | ***6-7*** | Dr Yusuf Al-Hiari | Challenging quiz1-9 | Problem solving, internet based questions |  |
| **2- Heterocyclic Compounds**  |  | Dr Yusuf Al-Hiari | 1-9 | Exams, Quizzes | 1,4 |
| **A-п-Deficient Hetero aromatic Compounds**  | 6 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| \* Introduction  | 6 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| \*Chemical/Physical Properties | 7 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| \*Synthesis of Pyrdines and their Fused Analogues  | 7 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,3,4 |
| \*Diazines and Triazines | 7 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| **B-п-Excessive Hetero aromatic Compounds** |  | Dr Yusuf Al-Hiari | 1-9 | Exams, Quizzes | 1,4 |
| \* Introduction  |  | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| \*Chemical/Physical Properties | 8 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| \*Synthesis  | 8 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| \*Azoles  | 8 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,4 |
| Short quiz 2 | 8 |  |  |  |  |
| 3-**Polycyclic Compounds** |  | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5, 6 | Exams, Quizzes | 1,3,4 |
| \*Naphalenes, Anthracenes, Anthracenes | 9 | Dr Yusuf Al-Hiari | 2-7 | Exams, Quizzes | 1,3,4 |
| ***Assignment*** 2(oral Discussion) | 10 | Dr Yusuf Al-Hiari | 1-9 | Oral discussion and group discussion  |  |
| \*Miscellaneous Poly- aromatic Nuclei | 10 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,3,4 |
| **4-Stereochemistry and Drugs** | 11 | Dr Yusuf Al-Hiari | 3-8 | Exams, Quizzes | 1,3,4 |
| \*stereochemistry principles and concepts | 11 | Dr Yusuf Al-Hiari | 1-2, 3, 4, 5 | Exams, Quizzes | 1,2,4 |
| \*Stereochemical aspects in Drugs | 12 | Dr Yusuf Al-Hiari | 1-9 | Exams, Quizzes | 1,2,4 |
| **Final Exam** | 13 |  |  |  |  |

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* Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
* Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz…etc

**23 Evaluation Methods:**

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| Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

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| **Evaluation Activity** | **Mark** | **Topic(s)** | **Period (Week)** | **Platform** |
| Quiz  | 10 |  1,2 |  3 | LMsystem  |
| Mid Exam | 30 | 1,2,3,4,5,6,7 | 7 | LMsystem  |
| Assignment  | 10 |  10,11 |  10 | LMsystem  |
| Final Exam | 50 | All | 15 | LMsystem  |

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**24 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):**

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| Student should have a computer and internet connection, webcam |

**25 Course Policies:**

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| 1. Attendance policies: Mandatory

First warning – with 4 absencesLast warning – with 5 absencesFailing in the subject – with 6 absencesB- Absences from exams and submitting assignments on time: Will result in zero achievement unless health report or other significant excuse is documented.C- Health and safety procedures: NoneD- Honesty policy regarding cheating, plagiarism, misbehavior: The participation, the commitment of cheating will lead to applying all following penalties together1) Failing the subject he/she cheated at2) Failing the other subjects taken in the same course3) Not allowed to register for the next semester. The summer semester is not considered as a semesterE- Grading policy:Quizzes 10 pointsAssignment 10 points Mid Exam 30 pointsFinal Exam 50 pointsTotal 100 pointsF- Available university services that support achievement in the course: computer, webcam, internet |

**26 References:**

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| A- Required book(s), assigned reading and audio-visuals:1. **Required book (s), assigned reading and audio-visuals:**
2. Organic Chemistry, [John E. McMurry](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=John+E.+McMurry&search-alias=books&text=John+E.+McMurry&sort=relevancerank); 8th edition 2012 or latest edition.
3. Foundation of Molecular Pharmacology “Pharmaceutical and Medicinal Chemistry”, Vol., J.B. Stanlake, 1st edition, 1979, 2ed edition 2005.
4. **Recommended books, materials, and media**:
5. Organic Chemistry, [Robert T. Morrison](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Robert+T.+Morrison&search-alias=books&text=Robert+T.+Morrison&sort=relevancerank), [Robert N. Boyd](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Robert+N.+Boyd&search-alias=books&text=Robert+N.+Boyd&sort=relevancerank), 6th ed, 1992.
6. Heterocyclic chemistry, by J.A. Joule, K. Mills and G.F. Smith. (1995 any edition
 |

**27 Additional information:**

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Name of Course Coordinator: Dr. Jehad Almaliti Signature: ------------------ Date: ------------

Head of Curriculum Committee/Department: ---------------------------- Signature: --------------------------

Head of Department: ------------------------------------------------------------ Signature: -----------------------

Head of Curriculum Committee/Faculty: ---------------------------------------- Signature: -------------------

Dean: ---------------------------------------------------------- Signature: -------------------------------------------