

Course Plan for Bachelor Program - Study Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-4.0E
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Study Plan No.	2021/2022		University Specialization		Bachelor of Pharmacy	
Course No.	0201416		Course Name		Medicinal Chemistry (3)	
Credit Hours	3		Prerequisite *Co-requisite		Medicinal Chemistry (2) + *Pharmacology (3)	
Course Type	☐ Mandatory University Requirement	☐ University Elective Requirement	☐ Faculty Mandatory Requirement	☐ Support course family requirements	☒ Mandatory Requirement	☐ Elective Requirement
Teaching Style	☐ Full Online Learning		☐ Blended Learning		☒ Traditional Learning	
Teaching Model	☐ 1 Synchronous: 1 Asynchronous		☐ 1 Face to Face: 1 Asynchronous		☒ 2 Traditional	

Faculty Member and Study Divisions Information (to be filled in each semester by the subject instructor)

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Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	Time	Place	Number of Students	Teaching Style	Approved Model
				Traditional Learning	2 Traditional

Brief Description

This advanced course builds on Medicinal Chemistry 1 and 2, deepening students' understanding of the chemical and biological principles of chemotherapeutic agents. It covers drug classes such as antibacterial, antifungal, antiviral, and anticancer agents, focusing on their chemistry, mechanisms of action, SAR, metabolism, and pharmacokinetics. Emphasis is placed on how structural and physicochemical properties affect drug efficacy and toxicity. The course also introduces prodrug design, metabolic activation, and synthetic strategies. By the end, students will be able to classify drug types, evaluate their properties, and apply critical thinking to drug and prodrug design.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	1. Harrold MW, Beck K, Roche VF, Zito SW, Lemke TL, Williams DA, and editors. <i>Foye's Principles of Medicinal Chemistry</i>. 9th ed. Philadelphia: Wolters Kluwer; 2025. 2. Patrick GL. <i>An Introduction to Medicinal Chemistry</i>. 7th ed. Oxford: Oxford University Press; 2023.			
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	1. Abraham DJ, Myers M, editors. <i>Burger's Medicinal Chemistry, Drug Discovery and Development</i>. 8th ed. Hoboken (NJ): Wiley; 2021. [8-volume set] 2. Lednicer D. <i>The Organic Chemistry of Drug Synthesis</i>. Vol. 7. Hoboken (NJ): Wiley-Interscience; 2007. 3. DrugBank. DrugBank Online [Internet]. Available from: https://go.drugbank.com.			
Supporting Websites				
The Physical Environment for Teaching	☒ Classroom	☐ Labs	☒ Virtual Educational Platform	☐ Others

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Necessary Equipment and Software	- Microsoft Office. - Moodle.
Supporting People with Special Needs	
For Technical Support	E-Learning & Open Educational Resources Center. Email: ellearning@zuj.edu.jo ; Phone: +962 6 429 1511 ext. 425/362.

Course learning outcomes (K= Knowledge, S= Skills, C= Competencies)

No.	Course Learning Outcomes	The Associated Program Learning Output Code
Knowledge		
The student should be able to:		
K1	Classify major chemotherapeutic drug classes including antibacterial, antibiotic, antimycobacterial, antifungal, antiparasitic, antiviral, and anticancer agents, based on their chemical structures and mechanisms of action.	MK2
K2	Compare the efficacy, toxicity, therapeutic advantages and disadvantages of different chemotherapeutic drug classes, including their metabolic transformations and major active or toxic metabolites.	MK2
K3	Describe the origins of chemotherapeutic agents (natural, semisynthetic, and synthetic) and the key strategies and chemical precursors used in their development.	MK2
Skills		
The student should be able to:		
S1	Analyze the physicochemical properties, such as electronic, lipophilic, and steric features, required for optimal drug–target interactions and pharmacokinetic performance.	MS4
S2	Evaluate the relationships between chemical structures, pharmacological activities, and physicochemical properties of chemotherapeutic agents.	MS4
S3	Rationalize the use of key functional groups and chemical strategies in prodrug design to enhance solubility, absorption, or site-specific activation.	MS4
Competencies		
The student should be able to:		
C1	Design drug and prodrug candidates based on functional group reactivity, target-specific activation mechanisms, and therapeutic objectives.	MC3

Mechanisms for Direct Evaluation of Learning Outcomes

Type of Assessment / Learning Style	Fully Electronic Learning	Blended Learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm Exam	30%	30%	30%	0%
Participation / Practical Applications	0%	0%	30%	50%

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Asynchronous Interactive Activities	20%	20%	0%	0%
Final Exam	50%	50%	40%	50%

Note 1: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, and work within student groups, etc., which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

Note 2: According to the Regulations of granting Master's degree at Al-Zaytoonah University of Jordan, 40% of final evaluation goes for the final exam, and 60% for the semester work (examinations, reports, research or any scientific activity assigned to the student).

Schedule of Simultaneous / Face-to-Face Encounters and their Topics

Week	Subject	Learning Style*	Reference **
1	Synthetic Antimicrobial Agents - Sulfonamides - Quinolones - Nitrofurans	Lecture	Textbook 1/ Chapter 33 Pages: 1080-1089
2	Antibiotics - β -Lactams - Penicillins	Lecture	Textbook 1/ Chapter 33 Pages: 1089-1098
3	- Penicillins - Cephalosporins - Carbapenems	Lecture	Textbook 1/ Chapter 33 Pages: 1098-1106
4	- Aminoglycosides - Macrolides - Tetracyclines - Lincomycins	Lecture	Textbook 1/ Chapter 33 Pages: 1106-1113
5	Antifungal Drugs - Polyenes - Azoles - Allylamines and others	Lecture	Textbook 1/ Chapter 35 Pages: 1161-1172
6	Antimycobacterial Agents - Treatment of tuberculosis (anti-TB) - Drug therapy for leprosy	Lecture	Textbook 1/ Chapter 36 Pages: 1179-1196
7	Antiparasitic Agents - Treatment of amebiasis, giardiasis, and trichomoniasis - Treatment of leishmaniasis	Lecture	Textbook 1/ Chapter 34 Pages: 1131-1133
8	Antiparasitic Agents - Treatment of pneumocystis (PCP) - Treatment of trypanosomiasis	Lecture	Textbook 1/ Chapter 34 Pages: 1133-1154
9	- Treatment of malaria		Textbook 1/ Chapter 34

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	- Drug therapy for helminth infections - Drug therapy for scabies and Pediculosis - MIDTERM EXAM	Lecture	Pages: 1133-1154
10	Antiviral Agents and Protease Inhibitors - Agents inhibiting virus attachment, penetration and replication - Agents interfering with viral nucleic acid replication	Lecture	Textbook 1/Chapter 38 Pages: 1278-1290
11	- Antiretroviral (anti-HIV) agents - Nucleoside and non-nucleoside reverse transcriptase inhibitors (NRTI and NNRTI)	Lecture	Textbook 1/Chapter 38 Pages: 1290-1300
12	Cancer Chemotherapy - Alkylating agents (nitrogen mustards)	Lecture	Textbook 1/ Chapter 37 Pages: 1207-1220
13	- Organoplatinum compounds - Nitrosoureas - Other alkylating agents	Lecture	Textbook 1/ Chapter 37 Pages: 1207-1220
14	- Antimetabolites and nucleoside analogues - Other antimetabolites - Antitumor antibiotics	Lecture	Textbook 1/Chapter 37 Pages: 1233-1251
15	- Antimitotic agents. - Miscellaneous antineoplastics	Lecture	Textbook 1/Chapter 37 Pages: 1224-1233
16	FINAL EXAM		

* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.

Schedule of Asynchronous Interactive Activities (in the case of e-learning and blended learning)

Week	Task / Activity	Reference	Expected Results
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