Course Plan for Bachelor Program - Study Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-4.0E

Study Plan No.	**2021/2022**		**University Specialization**		**Bachelor of Pharmacy**	
Course No.	**0201454**		**Course Name**		**Drug Discovery and Drug Design**	
Credit Hours	**3**		**Prerequisite *Co-requisite**		**Pharmaceutical Organic Chemistry (2) + Pharmacology (1)**	
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)*

Name	Academic rank	Office No.	Phone No.	E-mail	
Office Hours (Days/Time)	**Sunday, Tuesday, Thursday ()**		**Monday, Wednesday ()**		
Division number	**Time**	**Place**	**Number of Students**	**Teaching Style**	**Approved Model**
				Blended Learning	**1 Face to Face: 1 Asynchronous**

Brief Description

This course is designed to impart the knowledge in computational methods and drug design approaches. It aims to build students' knowledge in theoretical chemistry and its application in drug design. It is proposed to provide students with an understanding of ligand- and structure-based drug design strategies employing computer-aided drug design software.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	1- An Introduction of Medicinal Chemistry, 6th edition, Graham Patrick, Oxford University Press, 2017. 2- Foye's Principles of Medicinal Chemistry, 7th edition, Thomas L. Lemke and David A. Williams, Lippincott Williams & Wilkins, 2013.
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	1. Burger's Medicinal Chemistry and Drug Discovery, 6th edition, M. E. Wolff, 2003. 2. The Organic Chemistry of Drug Synthesis, Vol. 1-6, D. Lednicer and L. A. Mitscher, John Wiley and Sons.
Supporting Websites	

The Physical Environment for Teaching	☑ **Classroom**	☐ Labs	☑ **Virtual Educational Platform**	☐ Others
Necessary Equipment and Software	- PC/laptop with headphones and camera. - Data-show. - Microsoft Office. - Microsoft Teams. - ZOOM Platform. - Moodle.			
Supporting People with Special Needs				
For Technical Support	E-Learning & Open Educational Resources Center. Email: elearning@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	Recognize computational chemistry tools and their applications in drug design and discovery.	**MK2**
K2	Recognize modeling tactics in computer aided-drug design enterprises.	**MK2**
K3	Describe drug design approaches and their applications in drug development.	**MK2**
Skills **The student should be able to:**		
S1	Apply cheminformatics tools to calculate the physicochemical properties of drug series.	**MS4**
S2	Apply bioinformatics tools to browse the biological pool and identify drug target.	**MS4**
S3	Apply molecular modeling approach to explore the receptor's binding site and identify key binding residues.	**MS4**
Competencies **The student should be able to:**		
C1	Relate the drug design pipelines and their applications in optimizing drug's core-structure.	**MK2, MS4**

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%**	20%	50%

Asynchronous Interactive Activities	20%	**20%**	0%	0%
Final Exam	50%	**50%**	50%	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	Computational Chemistry	Lecture	Course Book 1/ Chapter 17 Pages (332-350)
2	Drug and Drug Target	Lecture	Course Book 1/ Chapter 1 Pages (1-16)
3	Drug Target-Proteins	Lecture	Course Book 1/ Chapter 2 Pages (17-29)
4	Drug Target- Enzymes	Lecture	Course Book 1/ Chapter 3 Pages (30-41)
5	Drug Target-Receptors	Lecture	Course Book 1/ Chapter 4 Pages (42-57)
6	Drug Target-Signal transduction	Lecture	Course Book 1/ Chapter 5 Pages (58-70)
7	Drug Target- Nucleic Acids	Lecture	Course Book 1/ Chapter 6 Pages (71-86)
8	Ligand-Based Drug Design (LBDD) Pharmacophore Modeling	Lecture	Course Book 1/ Chapter 17 Pages (332-350)
9	Ligand-Based Drug Design (LBDD) -Quantitative Structure-Activity Relationship (QSAR) **Midterm Exam**	Lecture	Course Book 1/ Chapter 18 Pages (377-398)
10	Ligand-Based Drug Design (LBDD) -Quantitative Structure-Activity Relationship (QSAR)	Lecture	Course Book 1/ Chapter 18 Pages (377-398)
11	Combinatorial Chemistry	Lecture	Course Book 1/ Chapter 16 Pages (307-316)

12	Structure-Based Drug Design (SBDD) -Molecular Modeling and Docking	Lecture	Course Book 1/ Chapter 17 Pages (332-350)
13	De Novo Drug Design	Lecture	Course Book 1/ Chapter 17 Pages (332-350)
14	Ligand-Based Drug Design (LBDD) -Quantitative Structure-Activity Relationship (QSAR)	Lecture	Course Book 1/ Chapter 18 Pages (377-398)
15	Ligand-Based Drug Design (LBDD) -Quantitative Structure-Activity Relationship (QSAR)	Lecture	Course Book 1/ Chapter 18 Pages (377-398)
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
1	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
2	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
3	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
4	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
5	Self-study	A selected topic	Assignment
6	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
7	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
8	Self-study	A selected topic	Assignment
9	**Midterm Exam**	-	-
10	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
11	Watch a recorded lecture	Video on the E-learning	Answer questions

		platform	embedded in the video / Assignment
12	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
13	Self-study	A selected topic	Assignment
14	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
15	Watch a recorded lecture	Video on the E-learning platform	Answer questions embedded in the video / Assignment
16	**Final Exam**	-	-