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.	**0201550**		**Course Name**		**Drug Informatics and Computational Biology**	
Credit Hours	**3**		**Prerequisite *Co-requisite**		**Medicinal Chemistry 3 + 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)*

Name	Academic rank	Office No.	Phone No.	E-mail	
Dr. Rima Hajjo					
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 get a better understanding of the drug discovery pipeline and the use of pharmacoinformatics (both cheminformatics and bioinformatics) tools to speed up drug discovery and minimize clinical failures.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	1) Chemoinformatics in Drug Discovery, Tudor I. Oprea (Editor); Raimund Mannhold (Series Editor); Hugo Kubinyi (Series Editor); Gerd Folkers (Series Editor), ISBN:9783527307531, Wiley-VCH Verlag GmbH & Co. KGaA, 2005. 2) Bioinformatics and Computational Biology in Drug Discovery and Development, Edited by William T. Loging, Mount Sinai School of Medicine, New York. Cambridge University Press, 2016.			
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	- PC/laptop with headphones and camera - Data-show - Microsoft Office - Microsoft Teams - ZOOM Platform - Moodle			
Supporting Websites	-			
The Physical Environment for Teaching	☑ **Classroom**	☐ Labs	☑ **Virtual Educationa**	☐ Others

			l Platform	
Necessary Equipment and Software	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 the drug discovery pipeline and its main obstacles	**MK2**
K2	Indicate diverse informatics tools, both chem- and bioinformatics, which can accelerate the drug discovery process from target identification to drug approval.	**MK2**
K3	Identify public databases and free informatics tools for drug discovery, target identification and drug safety assessment.	**MK2**
K4	Review machine learning methods applicable drug discovery data	**MK2**
K5	Recognize the importance of drug repurposing in speeding up the drug discovery process.	**MK2**
Skills **The student should be able to:**		
S1	Appraise different digital file formats for storing and manipulating drug discovery data for chemical compounds and bio-molecules.	**MS2**
S2	Apply cheminformatics tools to calculate molecular descriptors and relate structure with biological activity.	**MS2**
S3	Apply bioinformatics tools (e.g., network biology and gene and protein sequence searches) to identify plausible drug targets and biomarkers for diseases of interest.	**MS2**
Competencies **The student should be able to:**		
C1	Manage cheminformatics and bioinformatics resources that aid in the following tasks: 1) searching efficiently and quickly for drug, drug target and disease information, 2) identifying plausible links between drugs, genes, and diseases; 3) predicting drug side effects and toxicities.	**MC3**
C2	Develop his/her professional and personal performance by continuously following-up lectures, submitting tasks on time, and staying up to date with the latest pharmacoinformatics tools.	**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%**	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 ** (Pages in Course Book)
1	The drug discovery pipeline, clinical trial failures of drugs and drug repositioning as a solution.	Lecture	2
2	Cheminformatics methods for hit identification, lead optimization, virtual screening and drug repositioning.	Lecture	1 & 2
3	Structural file formats and molecular descriptors.	Lecture and Hands-on training	1 & 2
4	Machine learning methods to visualize and model big data in drug discovery (supervised and non-supervised machine learning methods).	Lecture	1
5	Databases and libraries.	Lecture	1
6	Cheminformatics applications: Quantitative structure activity relationship (QSAR) modeling, pharmacophore modeling, docking and scoring.	Lecture	1
7	Open-source tools and public data sources for cheminformatics	Hands-on training	1
8	Drug Discovery in Academia	Case study	1
9	**Midterm Exam**		
10	Bioinformatics methods for disease	Lecture	2

	understanding and for target and biomarker identification.		
11	Bioinformatics databases and files for storing biomolecular data.	Lecture	2
12	Sequence analysis, sequence searches and sequence alignment.	Lecture	2
13	Network biology and identifying drug-gene (protein)-disease connections).	Lecture	
14	Open-source and commercial tools for bioinformatics (protein and genetic data).	Hands-on training	Multiple Websites
15	Open-source and commercial tools and sources for network biology.	Hands-on training	Multiple Websites
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 platform	Answer questions 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**	**-**	**-**