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.	**0201372**		**Course Name**		**Biopharmaceutics and Pharmacokinetics**	
Credit Hours	**3**		**Prerequisite *Co-requisite**		**Pharmacology (1) + Pharmaceutical Dosage Forms (2)**	
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**
				Traditional Learning	**2 Traditional**

Brief Description

This course is intended to equip the students with the necessary knowledge about how the body deals with the medications via the ADME processes. And how a dosage regimen is designed based on the pharmacokinetics of medications. Also it sheds the light on the physiological aspects of drug elimination.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	Shargel, L., and A.B.C. Yu. 2015. Applied Biopharmaceutics & Pharmacokinetics, Seventh Edition (McGraw-Hill Education).			
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	Gibaldi, M., and D. Perrier. 1975. Pharmacokinetics (M. Dekker).			
Supporting Websites	-			
The Physical Environment for Teaching	☑ **Classroom**	☐ Labs	☑ **Virtual Educational Platform**	☐ Others
Necessary Equipment and Software	Moodle			
Supporting People with Special Needs	-			

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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	Identify pharmacokinetic parameters that describe the absorption, distribution, metabolism, and excretion (ADME) of drugs	**MK3**
K2	Describe various ADME processes, and the different pharmacokinetic models	**MK3**
K3	Recognize the effect of various disease states such as renal and kidney diseases on various ADME processes	**MK3**
Skills **The student should be able to:**		
S1	Solve different problems related to different pharmacokinetics models.	**MS1**
Competencies **The student should be able to:**		
C1	Formulate appropriate dosing regimen (single- or multiple-dose) for individualized drug therapy, based on information from single-dose studies or from literature	**MC1**
C2	Take responsibility of personal and professional development by handing the pharmacokinetics assignments on time.	**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	**Introduction to Biopharmaceutics and Pharmacokinetics** -Pharmacokinetics Introduction & Concepts -Plasma Level-Time curve - Pharmacokinetic models -Review of rates and orders of reactions	**Lecture**	Chapter 1 1-26 Chapter 2 40-42
2	**One compartment open model(IV bolus):** -calculation of volume of distribution -calculation of Elimination half-life and AUC	**Lecture**	Chapter 3 75-96
3	-calculation of k from plasma data - calculation of k from urinary excretion data - Learning questions	**Lecture**	Chapter 3 75-96
4	**Two compartment open model (IVbolus):** -Define the pharmacokinetic terms used in a two- and three-compartment model. -equations and graph to simulate plasma drug concentration -Estimate two-compartment model parameters by using the method of residuals.	**Lecture**	Chapter 4 97-114
5	-types of Volumes of distribution -Learning questions **Intravenous Infusion:** -the concept of steady state and how it relates to continuous dosing.	**Lecture**	Chapter 4 97-114 Chapter 5 131-148
6	- time needed to reach Css -loading dose plus IV infusion -calculating elimination half-life & K -estimation of drug clearance and Vd from infusion data - Learning Questions for IV infusion	**Lecture**	Chapter 5 131-148
7	**Pharmacokinetics of oral absorption:** - first order absorption models -calculation of plasma concentration, calculation of t max	**Lecture**	Chapter 8 196-204
8	-determination of absorption rate constant by method of residuals -Lag time and flip-flop of ka and k -determination of excretion rate constant from urine data -Learning Questions in single oral dose	**Lecture**	Chapter 8 196-204
9	**Multiple dosage regimens:**	**Lecture**	Chapter 9

	-drug accumulation & superposition principle -Repetitive intravenous bolus injections **Midterm Exam**		205-228
10	- Calculation of Missed dose -Early or Late Dose Administration during Multiple Dosing - Intermittent IV infusion	**Lecture**	Chapter 9 205-228
11	-Multiple oral dose regimen -Loading dose plus maintenance dose -Determination of bioavailability in multiple dose regimen -Learning Questions in multiple dosage regimens	**Lecture**	Chapter 9 205-228
12	**Drug Elimination and Renal Clearance:** Drug Elimination :metabolism &excretion -Total body clearance, clearance models	**Lecture**	Chapter 7 149-176
13	-Physiological processes of kidneys -1st order elimination, fraction of drug excreted and renal clearance -Learning Questions	**Lecture**	Chapter 7 149-176
14	**Drug Elimination and Hepatic Clearance:** -hepatic elimination of drugs, pathways for drug metabolism -1st order elimination, fraction of drug metabolized, hepatic clearance -1st pass effect,liver extraction ratio, intrinsic clearance	**Lecture**	Chapter 7 149-176
15	-**Bioavailability & Bioequivalence**: -definitions -Relative & Absolute availability -Methods for assessing bioavailability	**Lecture**	Chapter 16 469-528
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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