

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.	0201372	Course Name	Biopharmaceutics & 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	☐ 2 Synchronous: 1 Asynchronous	☐ 2 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)					
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. It also sheds 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, 7 th 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	☒ Class room ☐ Labs ☒ Virtual Educational Platform ☐ Others
Necessary Equipment and Software	Moodle
Supporting People with Special Needs	-
For Technical Support	E-Learning & Open Educational Resources Center Email: ellearning@zu.edu.jo ; Phone: +962 6 429 1511 ext. 425/362

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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	Estimate 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	Interpret 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	Plan appropriate dosing regimen (single- or multiple-dose) for individualized drug therapy, based on information from single-dose studies or from literature.	MS1
Competencies		
The student should be able to:		
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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%	60%
Asynchronous Interactive Activities	30%	30%	0	0
Final Exam	40%	40%	40%	40%

Note: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, 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.

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	Lecture	Chapter 1 1-26 Chapter 2 40-42

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	-Review of rates and orders of reactions		
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 (IV bolus): -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 C_{ss} -loading dose plus IV infusion -calculating elimination half-life & K -estimation of drug clearance and V_d 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 k_a 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: -drug accumulation & superposition principle -Repetitive intravenous bolus injections	Lecture	Chapter 9 205-228
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	Lecture	Chapter 9 205-228

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	-Learning Questions in multiple dosage regimens		
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 -1 st 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 -1 st order elimination, fraction of drug metabolized, hepatic clearance -1 st 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.