



Department	Pharmacy
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<b>Course Name</b>	Biopharmaceutics & Pharmacokinetics	<b>Course No.</b>	0201421
Prerequisite	(0201321) Pharmaceutics-3-	Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

<b>Course Objective</b>	<ol style="list-style-type: none"> <li>1. Ability to design and adjust a patient's drug dosage regimen to keep the plasma/serum concentration of the drug within a desired therapeutic range.</li> <li>2. Know the principles of the ADME of a drug, and how these apply to the optimum utilization of a drug in a patient.</li> <li>3. Have knowledge to apply biopharmaceutics and pharmacokinetics principles in pharmaceutical care.</li> </ol>
<b>Intended Learning Outcomes</b>	<p>At the end of this course, students will gain:</p> <ul style="list-style-type: none"> <li>• Knowledge and understanding <ol style="list-style-type: none"> <li>1. An understanding of the fundamental concepts of pharmacokinetics processes in humans</li> <li>2. An Understanding of the compartmental modeling and its significance</li> <li>3. A knowledge of the pharmacokinetics and biopharmaceutics of drugs after intravascular and extravascular routes of administration.</li> <li>4. A knowledge of the drug clearance</li> <li>5. A knowledge of the bioavailability and bioequivalence</li> </ol> </li> <li>• Cognitive skills (thinking and analysis). <ol style="list-style-type: none"> <li>1. The student should be able to analyze and scientifically use mathematical equations to understand the ADME of drugs in the body.</li> <li>2. The student should be able to relate the basic principles of biopharmaceutics and pharmacokinetics to practical clinical situations.</li> </ol> </li> </ul>
<b>Course Topics</b>	<ol style="list-style-type: none"> <li>1. Rates and orders of reactions</li> <li>2. Pharmacokinetics of IV bolus</li> <li>3. Pharmacokinetics of IV infusion</li> <li>4. Pharmacokinetics of oral route</li> <li>5. Multiple dosage regimen</li> <li>6. Drug elimination and Clearance</li> <li>7. Bioavailability &amp; Bioequivalence</li> </ol>



<b>Text Books</b>	Applied Biopharmaceutics & Pharmacokinetics 7 <sup>th</sup> edition, 2016, editor Leon Shargel			
<b>References</b>	1. Pharmacokinetics, Milo Gibaldi 2. Clinical pharmacokinetics, concepts and applications, Rowland Tozer 3. <a href="http://www.boomer.org/c/p1">http://www.boomer.org/c/p1</a>			
<b>Grade Determination</b>	1 <sup>st</sup> Exam = 25% 2 <sup>nd</sup> Exam = 25% Final Exam = 50%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizes) Final Exam = 50%	
<b>Course Outline</b>				
Week	Hours	Subjects	Chapters in Textbook	Notes
1	1 1 1	<b>Introduction to Biopharmaceutics and Pharmacokinetics</b> -Pharmacokinetics Introduction & Concepts -Plasma Level-Time curve - Pharmacokinetic models	1	
2	1 1 1	-Review of rates and orders of reactions <b>One compartment open model( IV bolus):</b> -calculation of volume of distribution -calculation of Elimination half-life and AUC	2 4	
3	1 1 1	-calculation of k from plasma data - calculation of k from urinary excretion data - Learning questions	4	
4	1 1 1	<b>Two compartment open model (IVbolus):</b> -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.	5	
5	1 1 1	-types of Volumes of distribution -Learning questions <b>Intravenous Infusion:</b> -the concept of steady state and how it relates to continuous dosing.	5 6	
6	1 1 1	- time needed to reach C <sub>ss</sub> -loading dose plus IV infusion -calculating elimination half-life & K -estimation of drug clearance and V <sub>d</sub> from infusion data	6	

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7	1 1 1	- Learning Questions for IV infusion <b>Pharmacokinetics of oral absorption:</b> - first order absorption models -calculation of plasma concentration, calculation of t max	8	
8	1 1 1	-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	8	
9	1 1 1	-Learning Questions in single oral dose <b>Multiple dosage regimens:</b> -drug accumulation & superposition principle -Repetitive intravenous bolus injections	9	
10	1 1 1 1	- Calculation of Missed dose -Early or Late Dose Administration during Multiple Dosing - Intermittent IV infusion	9	
11	1 1 1	-Multiple oral dose regimen -Loading dose plus maintenance dose -Determination of bioavailability in multiple dose regimen	9	
12	1 1 1	-Learning Questions in multiple dosage regimens <b>Drug Elimination and Renal Clearance:</b> Drug Elimination :metabolism &excretion -Total body clearance, clearance models	7	
13	1 1 1	-Physiological processes of kidneys -1 <sup>st</sup> order elimination, fraction of drug excreted and renal clearance -Learning Questions	7	
14	1 1 1	<b>Drug Elimination and Hepatic Clearance:</b> -hepatic elimination of drugs, pathways for drug metabolism -1 <sup>st</sup> order elimination, fraction of drug metabolized, hepatic clearance -1 <sup>st</sup> pass effect,liver extraction ratio, intrinsic clearance	12	
15	1 1 1	<b>-Bioavailability &amp; Bioequivalence:</b> -definitions -Relative & Absolute availability -Methods for assessing bioavailability	16	



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Approved by Dept. Chair		Date of Approval	
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**Extra Information:** (Updated every semester and filled by course instructor)

<b>Course Instructor</b>	Dr. Suhair Hikmat
<b>Office No.</b>	
<b>Extension</b>	306
<b>Email</b>	<a href="mailto:suhair.jasim@zuj.edu.jo">suhair.jasim@zuj.edu.jo</a>
<b>Office hours</b>	