


Philadelphia University	 PHILADELPHIA UNIVERSITY <small>THE WAY TO THE FUTURE</small>	Approved Date: 10/2022
Faculty: Pharmacy		Issue:
Department: Pharmacy		Credit Hours: 3
Academic Year: 2022-2023		Course Syllabus

Course Information

Course No.	Course Title	Prerequisite	
052043100	Biopharmaceutics & Pharmacokinetics	05204000 Pharmacology 2	
Course Type		Class Time	Room No.
<input type="checkbox"/> University Requirement <input checked="" type="checkbox"/> Faculty Requirement <input checked="" type="checkbox"/> Major Requirement <input type="checkbox"/> Elective <input type="checkbox"/> Compulsory		Sec1: Sun, Tue: 11:15-12:45	606
		Sec2: Mon, Wed: 12:45-14:15	620

Instructure Information

Name	Office No.	Phone No.	Office Hours	E-mail

Course Delivery Method

<input type="checkbox"/> Blended <input type="checkbox"/> Online <input checked="" type="checkbox"/> Physical			
Learning Model			
Percentage	Synchronous	Asynchronous	Physical
			100%

Course Description

This course is devoted to the exploration and examination of the physical and physicochemical behavior of drugs, dosage forms, and drug delivery systems in physiological milieu and their implications for pharmaceutical care. Drug absorption processes, bioavailability, and bioequivalence will be highlighted. Pharmacokinetic and Pharmacodynamic concepts, including absorption kinetics, volume of distribution, and compartmental models, will be introduced to the student.

Course Learning Outcomes

Number	Outcome	Corresponding Program Outcomes	Corresponding Competencies
Knowledge			
K1	Understand the compartmental modeling and its significance	Kp1,	C1
K2	Understand drug absorption, distribution and elimination	Kp1	C1
K3	Understand drug clearance including (total, renal and hepatic clearance)	Kp1	C1
K4	Understand pharmacokinetics and biopharmaceutics after I.V bolus, I.V infusion, and oral administration of drugs.	Kp1, Kp2, Kp3	C1, C2, C3
K5	Understand protein binding and its effects	Kp1, Kp2, Kp3	C1, C2, C3
K6	Understand bioavailability and bioequivalence	Kp1, Kp2, Kp3	C1, C2, C3
K7	Have a knowledge on biopharmaceutics consideration in multiple dosage regimen	Kp1, Kp2, Kp3	C1, C2, C3
Skills			
S1	Adapting a problem-solving approach through allowing the student to argue his point of view to his colleagues.	Sp1, Sp2	C7. C8
S2	Handle the semi-log and standard graph papers, and distinguish the resulted curves generated by ordered processes, and ability to calculate slopes and intercepts to extract pharmacokinetic processes according to the model under question.	Sp1, Sp2	C7. C8
S3	Use raw data and derive the pharmacokinetic models and parameters that best describe the process of drug absorption, distribution and elimination.	Sp1, Sp2	C7. C8

Learning Resources

Course Textbook	<ul style="list-style-type: none"> • Applied Biopharmaceutics and Pharmacokinetics., Shargel and A.B.C. Yu., Appleton & Lange/MacGraw-Hill, New York., 7th edition 2016. ISBN: 978-0-07-182964-9 • Applies clinical pharmacokinetics, Bauer, Larry A. Appleton & Lange/MacGraw-Hill, New York., 2nd edition 2008. 10.1036/0071476288 • Clinical Pharmacokinetics Concepts and Application s. MALCOLM ROWIAND and THOMASN. TOZER., 1994, 3rd edition. LIpPINCOTT WILLIAMS&WILKINS
Supporting References	<ol style="list-style-type: none"> 1. Specialized softwares as WinNonlin® standard and PowerPoint presentations. 2. Merck Index: An Encyclopedia of Chemicals, Drugs, & Biologicals by Merck, Co, Maryadele J. Oneil (Editor), Ann Smith (Editor) 13th edition (October 2001), Merck & Co; ISBN: 0911910131 3. Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical

	<p>Sciences by Alfred Martin, Pilar Bustamante, A.H.C. Chun (Illustrator) 622 pages 4th edition (January 15, 1993), Lea & Febiger; ISBN: 0812114388</p> <p>4. Remington: The Science and Practice of Pharmacy by Alfonso R. Gennaro (Editor) 20th edition (December 15, 2000), Lippincott, Williams & Wilkins; ISBN: 0683306472</p>
Supporting Websites	<ul style="list-style-type: none"> • PHARMACOKINETICS – CALCULATORS, TOOLS, ETC. HTTPS://GLOBALRPH.COM/PHARMACOKINETICS/ • Drug Half Life Calculator • HTTPS://WWW.OMNICALCULATOR.COM/HEALTH/DRUG-HALF-LIFE • COMPUTERISED BAYESIAN DOSE CALCULATION
Teaching Environment	<input checked="" type="checkbox"/> Classroom <input type="checkbox"/> laboratory <input type="checkbox"/> Learning Platform <input type="checkbox"/> Other

Meetings and Subjects Time Table

Week	Topic	Learning Method*	Task	Learning Material
1	<p>Vision and Mission of Faculty of Pharmacy</p> <p>Course Syllabus</p> <p>Introduction</p>	Lecture		<p>Vision and Mission of Faculty of Pharmacy</p> <p>Course Syllabus</p> <p>Text book, Chapter 1</p>
2	Mathematical fundamentals in pharmacokinetics	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 		Text book, part 1, Chapter 2
3	Review of rates and orders of reactions: 1st order and 2nd order: practice problems	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 		Text book, part 2, Chapter 2
4	One-Compartment mathematical open model: intravenous bolus administration: Elimination rate constant, apparent volume of distribution, clearance, area under the curve,	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 	Case study	Text book, Chapter 4

	calculation from plasma data, practice problems			
5	Multi-Compartment model: intravenous bolus administration: Two-compartment model: Pharmacokinetics parameters: half-life, rate constants	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 	Case study	Text book, part 1, Chapter 5
6	Multi-Compartment model: intravenous bolus administration: Two-compartment model: volume of distribution, area under the curve, practice problems	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 		Text book, part 2, Chapter 5
7	Drug elimination and clearance 1) Renal drug excretion 2) Drug clearance i) Determination of renal clearance	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 	Case study	Text book, part 1, Chapter 7
8	Drug elimination and clearance ii) Determination of hepatic clearance	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 		Text book, part 2, Chapter 7
9	Drug elimination and clearance: Practice problems	<ul style="list-style-type: none"> • Lecture • Problem solving based learning 		Text book, part 3, Chapter 7
10	Drug elimination and clearance: Practice problems	<ul style="list-style-type: none"> • Lecture • Problem solving based learning • Collaborative learning 		Text book, part 4, Chapter 7
11 Mid exam	Multiple dosing regimen: Drug accumulation, repetitive IV injection	<ul style="list-style-type: none"> • Lecture • Problem solving based learning • Collaborative learning 		Text book, part 1, Chapter 9
12	Multiple dosing regimen: loading dose, scheduling of dosage regimen	<ul style="list-style-type: none"> • Lecture • Problem solving based learning • Collaborative learning 	Case study	Text book, part 2, Chapter 9
13	Multiple dosing:	<ul style="list-style-type: none"> • Lecture 	Pharmacokinetics-	Text book,

	Practice problems	• Problem solving based learning	Calculators, Tools	part 3, Chapter 9
14	Bioavailability and bioequivalence: relative and absolute bioavailability, methods of assessing bioavailability	• Lecture • Problem solving based learning		Text book, part 1, Chapter 16
15	Bioavailability and bioequivalence: short overview of bioequivalence studies, practice problems	• Lecture • Problem solving based learning		Text book, part 2, Chapter 16
16	Final Exam			

- Case Study: Prepared by the lecturer, adapted from the text book and other references.
- Includes: lecture, flipped Class, project-based learning, problem solving based learning, collaboration learning.

Course Contributing to Learner Skill Development

Using Technology	
<ul style="list-style-type: none"> • Using PowerPoint or any relevant program for preparing presentations • Using smart application for dosing regimens • Using online application for dosing regimens for pharmacokinetic calculations 	
Communication Skills	
<ul style="list-style-type: none"> • Interaction in class while solving case-study 	
Application of Concept Learnt	
<ul style="list-style-type: none"> • Apply the knowledge obtained from this course to evaluate individualization of the dose • Apply the knowledge obtained from this course to solve problems disease state, drug-drug interaction and different dosage form 	

Assessment Methods and Grade Distribution

Assessment Methods	Grade	Assessment Time (Week No.)	Course Outcomes to be Assessed
Mid Term Exam	30%	11 th Week	K1, K2, K3,
Term Works*	30%	Continuous	K1, K2, K4, K5, S1, S2
Final Exam	40%	16 th Week	K1, K2, K3, K4, K5, K6, K7, S1, S2
Total	100%		

* Include: quizzes, in-class and out of class assignment, presentations, reports, videotaped assignment, group or individual project.

Alignment of Course Outcomes with Learning and Assessment Methods

Number	Learning Outcomes	Corresponding Competencies	Learning Method*	Assessment Method**
Knowledge				
K1	Understand the compartmental modeling and its significance	C1	<ul style="list-style-type: none"> • Lectures • Problem solving based learning 	Subjective quiz Exam/Objective questions
K2	Understand drug absorption, distribution and elimination	C1	<ul style="list-style-type: none"> • Lectures • Problem solving based learning 	Subjective quiz Exam/Objective questions
K3	Understand drug clearance including (total, renal and hepatic clearance)	C1	<ul style="list-style-type: none"> • Lecture • Problem solving based learning • Collaborative learning 	Case Study Exam/Objective questions
K4	Understand pharmacokinetics and biopharmaceutics after I.V bolus, I.V infusion, and oral administration of drugs.	C1, C2, C3	<ul style="list-style-type: none"> • Lectures • Problem solving based learning 	Case Study Subjective quiz Exam/Objective questions
K5	Understand protein binding and its effects	C1, C2, C3	<ul style="list-style-type: none"> • Lectures • Problem solving based learning 	Case Study Subjective quiz Exam/Objective questions
K6	Understand bioavailability and bioequivalence	C1, C2, C3	<ul style="list-style-type: none"> • Lectures • Problem solving based learning 	Case Study Subjective quiz Exam/Objective questions
K7	Have a knowledge on biopharmaceutics considerations in multiple dosage regimen	C1, C2, C3	<ul style="list-style-type: none"> • Lectures • Problem solving based learning • Collaborative learning 	Case Study Subjective quiz Exam/Objective questions Pharmacokinetics

				– Calculators, Tools
Skills				
S1	Adapting a problem-solving approach through allowing the student to argue his point of view to his colleagues.	C7. C8	Lecture Problem solving based learning	Case Study Subjective quiz Exam/Objective questions
S2	Handle the semi-log and standard graph papers, and distinguish the resulted curves generated by ordered processes, and ability to calculate slopes and intercepts to extract pharmacokinetic processes according to the model under question.	C7. C8	Lecture Problem solving based learning	Case Study Subjective quiz Exam/Objective questions
S3	Use raw data and derive the pharmacokinetic models and parameters that best describe the process of drug absorption, distribution and elimination.	C7. C8	Lecture Problem solving based learning	Case Study Subjective quiz Exam/Objective questions Pharmacokinetics – Calculators, Tools

*Include: lecture, flipped class, project based learning, problem solving based learning, collaboration learning.

** Include: quizzes, in-class and out of class assignments, presentations, reports, videotaped assignments, group or individual projects.

Course Polices

Policy	Policy Requirements
Passing Grade	The minimum pass for the course is (50%) and the minimum final mark is (35%).
Missing Exams	<ul style="list-style-type: none"> • Anyone absent from a declared semester exam without a sick or compulsive excuse accepted by the dean of the college that proposes the course, a zero mark shall be placed on that exam and calculated in his final mark. • Anyone absents from a declared semester exam with a sick or compulsive excuse accepted by the dean of the college that proposes the course must submit proof of his excuse within a week from the date of the excuse's disappearance, and in this case, the subject teacher must hold a compensation exam for the student. • Anyone absents from a final exam with a sick excuse or a compulsive excuse accepted by the dean of the college that proposes the material must submit proof of his excuse within three days from the date of holding that exam.
Attendance	The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lecture days (n t) and seven lectures (days). If the student misses more than (15%) of the total hours

	prescribed for the course without a satisfactory or compulsive excuse accepted by the dean of the faculty, he is prohibited from taking the final exam and his result in that subject is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college that The article is introduced, it is considered withdrawn from that article, and the provisions of withdrawal shall apply to it.
Academic Integrity	Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as cheating, plagiarism (academic theft), collusion, intellectual property rights.

Program Learning Outcomes to be Assessed in this Course

Number	Learning Outcome	Course Title	Assessment Method	Targeted Performance level

Description of Program learning Outcomes Assessment Method

Number	Detailed Description of Assessment

Assessment Rubric of the Program Learning Outcomes

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