Philadelphia University		Approved Date:
Faculty: Pharmacy	PHILADELPHIA UNIVERSITY THE WAY TO THE FUTURE	Issue:
Department: Pharmacy		Credit Hours: 3
Academic Year: 2021-2022	Course Syllabus	Bachler:

Course Information

Course No.	Course Title	Prerequisite
052043100	**Biopharmaceutics & Pharmacokinetics**	**05204000 Pharmacology 2**

Course Type			Class Time	Room No.
☐ University Requirement ■ Major Requirement	■ Faculty Requirement ☐ Elective ☐ Compulsory		Sec1: Sun, Tue: 12:45-14:15	620

Instructure Information

Name	Office No.	Phone No.	Office Hours	E-mail
Ms. Farah Luay Alhassan	**527**	**+96264799000**	Mon, Wed: 12:45-14:15	**falhassan@philadelphia.edu.jo**

Course Delivery Method

☐ **Blended**	☐ **Online**	■ **Physical**
Learning Model		
	Synchronous	Asynchronous	Physical
Percentage			**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 Pharmacodynamics 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 it's 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 considerations 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	- 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 ROWlAND and THOMASN. TOZER., 1994, 3rd edition. LIpPINCOTT WILLIAMS&WILKINS
Supporting References	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

	Sciences by Alfred Martin, Pilar Bustamante, A.H.C. Chun (Illustrator) 622 pages 4th edition (January 15, 1993), Lea & Febiger; ISBN: 0812114388 4. Remington: The Science and Practice of Pharmacy by Alfonso R. Gennaro (Editor) 20th edition (December 15, 2000), Lippincott, Williams & Wilkins; ISBN: 0683306472
Supporting Websites	• 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	■ **Classroom** ☐ **laboratory** ☐ **Learning Platform** ☐ **Other**

Meetings and Subjects Time Table

Week	Topic	Learning Method*	Task	Learning Material
1	**Vision and Mission of Faculty of Pharmacy** **Course Syllabus** **Introduction**	Lecture		Vision and Mission of Faculty of Pharmacy Course Syllabus Text book, Chapter 1
2	Mathematical fundamentals in pharmacokinetics	• 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	• 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,	• 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	• 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	• 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	• Lecture • Problem solving based learning	Case study	Text book, part 1, Chapter 7
8	**Drug elimination and clearance** ii) Determination of hepatic clearance	• Lecture • Problem solving based learning		Text book, part 2, Chapter 7
9	**Drug elimination and clearance:** Practice problems	• Lecture • Problem solving based learning		Text book, part 3, Chapter 7
10	**Drug elimination and clearance:** Practice problems	• Lecture • Problem solving based learning • Collaborative learning		Text book, part 4, Chapter 7
11 Mid exam	**Multiple dosing regimen:** Drug accumulation, repetitive IV injection	• Lecture • Problem solving based learning • Collaborative learning		Text book, part 1, Chapter 9
12	**Multiple dosing regimen:** loading dose, scheduling of dosage regimen	• Lecture • Problem solving based learning • Collaborative learning	Case study	Text book, part 2, Chapter 9
13	**Multiple dosing:**	• Lecture	Pharmacokin	Text book,

	Practice problems	• Problem solving based learning	etics – 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
• 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
• Interaction in class while solving case-study
Application of Concept Learnt
• 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%**	**11th Week**	**K1, K2, K3,**
Term Works*	**30%**	**Continuous**	**K1, K2, K4, K5, S1, S2**
Final Exam	**40%**	**16th 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 it's significance	**C1**	• Lectures • Problem solving based learning	Subjective quiz Exam/Objective questions
K2	Understand drug absorption, distribution and elimination	**C1**	• Lectures • Problem solving based learning	Subjective quiz Exam/Objective questions
K3	Understand drug clearance including (total, renal and hepatic clearance)	**C1**	• 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**	• Lectures • Problem solving based learning	Case Study Subjective quiz Exam/Objective questions
K5	Understand protein binding and its effects	**C1, C2, C3**	• Lectures • Problem solving based learning	Case Study Subjective quiz Exam/Objective questions
K6	Understand bioavailability and bioequivalence	**C1, C2, C3**	• 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**	• 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	• 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 hisfinal mark. • Anyone absent 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 absent 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 collegethat 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 areapplied 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