Faculty: Graduate Studies	
Department: Pharmaceutical Sciences	**Program: MSc in Pharmaceutical Sciences**
Semester: 2nd	**Academic year: 2023/2024**

Course Plan

First: Course Information

Course Name: 1101705	***Applied Biopharmaceutics and Pharmacokinetics***	***Credit Hours:3***	
Prerequisite:	***Class Number:1***	***Lecture Time: 12-3***	
Level in JNQF	***9***	***Virtual hours in the JNQF***	***120***
Type Of Course:	☐ ***Obligatory University Requirement*** ☐ ***Elective University Requirement*** ■ ***Obligatory Faculty Requirement*** ☐***Elective Faculty Requirement*** ☐ ***Obligatory Specialization Requirement*** ☐ ***Elective Specialization requirement*** ☐***Ancillary course***		
Type of Learning:	■ ***Face-to-Face Learning*** ☐ ***Blended Learning (2 Face-to-Face + 1Asynchronous)*** ☐ ***Online Learning (2 Synchronous+1 Asynchronous)***		

Second: Instructor's Information

Course Coordinator:	***Dr. Rana Abutaima***	
Name: Dr. Rana Abutaima	***Academic Rank: Assistant Professor***	
Office Number: 229 D	***Phone Number: 1453***	***Email: rabutaima@zu.edu.jo***
Office Hours:	***Sunday…. Monday…. Tuesday…. Wednesday……. Thursday*** ***Sunday…. Monday…. Tuesday…. Wednesday…. Thursday***	

Third: Course Description

This course will discuss briefly the various effects of physicochemical properties of active ingredients, pharmaceutical dosage forms, physiological factors and routes of administration on drug bioavailability. In order to evaluate the pharmacological activities and/or toxicities of a drug, the concept of Pharmacokinetics, including its linked models and other factors that might affect drug's kinetics (i.e .drug Absorption, Distribution, Metabolism, and Excretion) will be discussed. Handling kinetic data and using the mathematical calculations to solve problems that might pharmacist face in clinical set up. Emphasis will be placed upon the prediction of plasma levels of drugs under varying

conditions applying different pharmacokinetic parameters and correlate this level plasma level with their pharmacological responses. In addition, this course is intending to study the performance of the drug in vivo by introducing and discussing how to design and analyze bioavailability and bioequivalence studies.

Fourth: Course objectives

1. Understanding mathematics of the time course of Absorption, Distribution, Metabolism, and Excretion (ADME) of drugs in the body.
2. Designing dosing regimens by relating plasma concentration of drugs to their pharmacological and toxicological action.
3. Understanding the differences among pharmacokinetic approaches for modeling concentration time data.
4. Understanding the theory behind bioequivalence.
5. Understanding In vivo In vitro correlation (IVIVC) concept

Fourth: Learning Outcomes

Level descriptor according to (JNQF)	*CILOs Code*	*CILOs* If any CLO will not be assessed in the course, mark NA.	*Associated PILOs Code* *Choose one PILO for each CILO**	*Assessment method* *Choose at least two methods*	*Scores out of 100* State the total score identified for each CILO	*Minimum acceptable Score/percentage (%)* *The percentage should not be less than 50% **
Knowledge	**K1**	Describe the Concept and theory of Biopharmaceutics and Pharmacokinetics	P. K1	Mid and open book final exams	10	5 (50%)
	K2	Identify the basic concepts of biopharmaceutics to know how certain drugs pharmacokinetics could be predicted via pharmacokinetic models	P. K1	Mid and open book final exams	10	5 (60%)
Skills	**S1**	Apply the basic knowledge in solving problems relevant to dosing regimens of different drugs	P. S1	Mid and final exams	20	10 (50%)
	S2	Relate how pharmacokinetic models are applied in predicting drugs' concentrations	P. S1	Mid exam and case studies	20	10 (50%)
	S3	Design a bioequivalence study	P. S3	Group work and open book final exams	10	5 (50%)
	S4	Analyze the results of bioequivalence and IVIVC data	P. S1	Group work and open book final exams	20	10 (50%)
Competencies	**C1**	Evaluate the resultant pharmacokinetic predictions in a scientific approach	P.C1	Group work and case studies	10	5 (50%)

*For each CILO, the PILO could be the same or different
****80% of the students*** must achieve the minimal acceptable percentage or higher for each CILO

Fifth: Learning Source

Designated Book:	***Applied Biopharmaceutics and Pharmacokinetics, Leon Shargel, MCgRAW Hill, 2017, 7th edition***	
Author: Leon Shargel	***Issue: :Print:7th***	***Year: 2017***
Additional Sources: Website:	***Basic Pharmacokinetics, Sunil Jambhekar and p-hilip Breen, Pharmaceutical Press, 2009, First edition.*** ***Winter's Basic and Clinical Pharmacokinetics, Paul Beringer, Wolters Kluwer, 2017, 6th edition***	
Teaching Type:	***Classroom*** ■ ***Laboratory*** □ ***Workshop*** ■ **MS Teams** □ **Moodle** ■	

Sixth: Course Structure

Lecture Date	Topics	Teaching Procedures*	Teaching Methods***	Covered CILOs	References***
9/3/2024	Introduction to Biopharmaceutics & Pharmacokinetics	Direct	Lecture	K1, K2, S1, S2, C3	Shargel Ch. 1 (p. 1-26), Ch. 15 (p. 415-468)
16/3/2024	Introduction to Biopharmaceutics & Pharmacokinetics	Direct	Problem-solving	K1, K2, S1, S2, C3	Shargel Ch. 1 (p. 1-26), Ch. 15 (p. 415-468)
23/3/2024	Compartmental PK (one compartment model)	Direct	Lecture	K1, K2	Shargel (p. 75-96)
30/3/2024	Compartmental PK (one compartment model)	Direct	Problem-solving	S1, S2	Shargel (p. 75-96)
6/4/2023	Compartmental PK (two compartment model)	Direct	Lecture	K1, K2	Shargel (p. 97-129)
20/4/2024	Compartmental PK (two compartment model)	Direct	Problem-solving	K1, K2, S1, S2, C1	Shargel (p. 97-129)
27/4/2024	Non-linear Pharmacokinetics	Direct	Lecture	K1, K2, S1, S2, C1	Shargel (p. 229-256)
4/5/2024	Non-compartmental Pharmacokinetics	Direct	Problem-solving	K1, K2, S1, S2, C1	Shargel (p. 817-850)
11/5/2024	Bioavailability	Direct	Lecture	K1, K2	Shargel (p. 469-528)

18/5/2024	Bioequivalence and statistical bioequivalence	Direct	Project-based teaching	S3, S4	Shargel (p. 469-528)
1/6/2024	IVIVC	Direct	Project-based teaching	S3, S4	Shargel (p. 415-468)

Education procedures: (Direct, synchronous, asynchronous). * * Teaching methods: Lecture, video…..). * * Reference: Pages of the book, recorded lecture, video….)

Seventh: Assessment methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Measurable Course (CILOs); **Specific Course Output to be measured** *State the score identified for each CILO for each method of assessment out of 100 **If any CILO will not be assessed in the course, mark NA.												
				K1	K2	K3	S1	S2	S3	S4	S5	C1	C2	C3	C4	C5
Mid-term Exam			*	5	5		5	5	5	5						
Final Exam			*	5	5		15	15								
Quizzes																
Case studies									5			5				
Group presentation			*							15		5				
Total out of 100				10	10		20	20	10	20		10				

Eighth: Course Polices

- All course policies are applied on all teaching patterns (online, blended, and face-to-face Learning) as follows:
  a. Punctuality.
  b. Participation and interaction.
  c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).
- Meeting the deadline for the lecture.
- Commitment to interaction and participation.
- Interactive lectures will be given through a platform (MS Teams).
- Duties and tests will be given through a platform (Moodle).
- Commitment to the right appearance with the proper background in front of the camera.
- University regulations for attendance and absence from lectures and examinations are in force.
- Academic Integrity: According to university regulations and instructions, fraud or moral impersonation is unacceptable and punishable.

Approval	Name	Date	Signature
Head of Department			
Faculty Dean			