

Course Syllabus

1	Course title	Biopharmaceutics	
2	Course number	1203471	
3	Credit hours	2 theoretical hours	
	Contact hours (theory, practical)	2 theoretical hours	
4	Prerequisites/corequisites	1202235	
5	Program title	BSc Pharmacy, PharmD	
6	Program code		
7	Awarding institution	The University of Jordan	
8	School	Pharmacy	
9	Department	Biopharmaceutics and Clinical Pharmacy	
10	Course level	4 th year	
11	Year of study and semester (s)	2023/2024 – First semester	
12	Other department (s) involved in teaching the course	None	
13	Main teaching language	English	
14	Delivery method	<input type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input checked="" type="checkbox"/> Fully online	
15	Online platforms(s)	<input checked="" type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....	
16	Issuing/Revision Date	10/2023	

17 Course Coordinator:

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18 Other instructors:

None

19 Course Description:

Biopharmaceutics is a core course that handles the effects of various physicochemical properties of drugs and drug products on their bioavailability. It covers the potentials as well as barriers for different routes of drug administration.

The course introduces the importance of proper *in vitro* testing for better simulation of the *in vivo* drug administration.

20 Course aims and outcomes:

A- Aims:

- To Identify the extracellular and cellular barriers for the absorption of conventional drugs as well as for biotechnology products.
- To be able to discuss the effect of physicochemical properties and dosage form design on the bioavailability of drugs after extravascular administration.
- To define the different routes of drug administration and illustrate in each case the histologic and anatomic properties specific to that route

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

Descriptors		SLOs	Learner	Care giver	Communicator	Professionalism
		SLOs of the course				
Knowledge	K1	Recall the physiological and anatomical aspects involved in drug permeation across different barriers	✓			
	K2	Define various terms related to bioavailability and bioequivalence and the estimation of rate and extent of absorption	✓			
	K3	Appreciate physiological and selected diseases' effect on the absorption and the subsequent therapeutic outcome of an orally administered drug	✓			
Skills	S1	Identify patient factors which may affect drug absorption and require a modification of the regular posology and administration of prescribed drugs		✓		
	S2	Compare and contrast different routes of drug administration and the				✓

potential and limitations of
each drug delivery route

21. Topic Outline and Schedule:

Week	Lecture	Topic	Student Learning Outcome (CLOs)	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Introduction to course outline		Fully online	Moodle	Synchronous		Main reference
	1.2	Introduction to biopharmaceutics	K1	Fully online	Moodle	Synchronous		Main reference

Week	Lecture	Topic	Student Learning Outcome (CLOs)	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
2	2.1	Bioavailability and parenteral drug absorption	K2	Fully online		Synchronous	Mid term and Final Exams	Physiological Pharmaceutics
	2.2	Drug Absorption Physiologic factors related to drug absorption: cell membrane	K1	Fully online	Moodle	Synchronous	Self reading paper followed by QUIZ	Main reference and Physiological Pharmaceutics
3	3.1	Mechanisms of drug transport across membranes	K1	Fully online	Moodle	Synchronous	Mid term and Final Exams	
	3.2	Models for assessing drug permeability (in vitro)		Fully online	Moodle	Synchronous	Mid term and Final Exams	Main reference and Physiological Pharmaceutics
4	4.1	Oral drug absorption: anatomic and physiologic considerations	K1, K2	Fully online		Asynchronous	Self assessment quiz	Main reference and Physiological Pharmaceutics
	4.2	Effect of food and disease on gastric emptying	K1, K3, S1	Fully online	Moodle	Synchronous	Mid term and Final Exams	Main reference and Physiological Pharmaceutics
5	5.1	Physicochemical factors that influence drug absorption: pH partition hypothesis	K1	Fully online	Moodle	Synchronous	Mid term and Final Exams	Aulton's Pharmaceutics and main reference

Week	Lecture	Topic	Student Learning Outcome (CLOs)	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
	5.2	Physicochemical factors that influence drug absorption	K1	Fully online	Moodle	Synchronous	Mid term and Final Exams	Aulton's Pharmaceutics and main reference
6	6.1	Physicochemical factors that influence drug absorption (dosage form)	K3, S1	Fully online		Asynchronous	Self learning, and quiz	Aulton's Pharmaceutics
	6.2	BCS		Fully online	Moodle	Synchronous	Mid term and Final Exams	Paper
7	7.1	Dissolution testing 1		Fully online	Moodle	Synchronous	Mid term and Final Exams	Main reference
	7.2	Dissolution testing 2		Fully online		Asynchronous	Narrated lecture followed by quiz	Main reference
8	8.1	In vitro in vivo correlation		Fully online	Moodle	Synchronous	Mid term and Final Exams	
	8.2	Midterm		FACE to FACE				
9	9.1	Drug absorption via the lung I	S2	Fully online	Moodle	Synchronous	Mid term and Final Exams	Main reference
	9.2	Drug absorption via the lung II	S2	Fully online	Moodle	Synchronous	FORUM: inhalation devices (Video)	
10	10.1	Drug absorption via the skin I	S2	Fully online	Moodle	Synchronous	Mid term and Final Exams	Main reference
	10.2	Drug absorption via the skin II	K2, S2	Fully online		Asynchronous	FORUM:	Main reference

Week	Lecture	Topic	Student Learning Outcome (CLOs)	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
							Developing technologies)	
11	11.1	Buccal drug absorption	K2, S2	Fully online	Moodle	Synchronous	Mid term and Final Exams	Main reference
	11.2	Nasal drug absorption	K2, S2	Fully online	Moodle	Synchronous	Mid term and Final Exams	Main reference
12	12.1	Biopharmaceuticals	K2, S2	Fully online		Asynchronous	Narrated lecture and self assessment quiz	FDA website
	12.2	Drug Targeting	S1, S2	Fully online	Moodle	Synchronous	Mid term and Final Exams	Paper
13	13.1	Discussion of Assignment		FACE to FACE				
	13.2	Discussion of Assignment		FACE to FACE				
14	14.1	Discussion of Assignment		FACE to FACE				
	14.2	Discussion of Assignment		FACE to FACE				

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
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Quizzes	10	Bioavailability Selected paper		3 and 10	JU exams, on campus
Midterm	30	Topics covered during weeks 1-6		1-7	On campus
Semester Assignment	10	Effect of patient factors on drug absorption		10, 13-14	Moodle/on campus
Self-assessment quiz/discussions/forum	10	Multiple, shown in section 21		During asynchronous learning	Moodle
Final	40	Topics covered during weeks 1-12		15	On campus

23 Course Requirements

All students should have a computer, an internet connection, a microphone, and a webcam

24 Course Policies:

A- Attendance policies: Students are allowed up to 5 absences

B- Absences from exams and handing in assignments on time:

- Midterm quiz: a justified excuse should be submitted and accepted by the instructor in order to be eligible for a makeup.
- Final Exam: a justified excuse should be submitted and accepted by the Dean in order to be eligible for and "incomplete" exam.

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior:

The participation, the commitment of cheating, plagiarism or misbehavior will lead to applying all following penalties together

- 1) Failing the subject he/she cheated at
- 2) Failing the other subjects taken in the same course
- 3) Not allowed to register for the next semester
The summer semester is not considered as a semester.

25 References:

A. Required book (s), assigned reading and audio-visuals:

1. Applied biopharmaceutics and pharmacokinetics, Shargel and Yu, 7th edition, 2016, McGraw-Hill Medical, ISBN-10 : 0071830936 (Main reference)

B. Additional book (s), assigned reading and audio-visuals:

2. Aulton's Pharmaceutics Michael Aulton and Kevin Taylor, 5st edition, 2018
3. Physiological Pharmaceutics: Barriers to Drug Absorption, Neena Washington, Clive Washington, Clive Wilson, 2nd edition, Taylor and Francis, 2001. ISBN: 0-748-40610-7
4. Biopharmaceutics: From Fundamentals to Industrial Practice by Hannah Batchelor, 2021 ISBN-13: 978-1119678281
5. Essentials of Biopharmaceutics and Pharmacokinetics, Ashutosh Kar, 2011, Elsevier. ISBN: 978-81-312-2639-1
6. Principles and applications of biopharmaceutics and pharmacokinetic, Tipnis & Bajaj, 2008. Career Publications, ISBN: 9788188739141
7. Biopharmaceutics Applications in Drug Development, Rajesh Krishna , Lawrence Yu, 2008, ISBN10 0387723781
8. Passive and Active Drug Targeting: Drug Delivery to Tumors as an Example Torchilin V.P. (2010). In: Schäfer-Korting M. (eds) Drug Delivery. Handbook of Experimental Pharmacology, vol 197. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-00477-3_1

6 Additional information:

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Name of Course Coordinator Rana Abu-Dahab	Signature: -----	Date: -----
Head of Curriculum Committee/Department: -----	Signature: -----	
Head of Department: -----	Signature: -----	
Head of Curriculum Committee/Faculty: -----	Signature: -----	

Dean: ----- Signature: -----