

Course E-Syllabus

1	Course title	Pharmaceutical Biotechnology
2	Course number	1201535
3	Credit hours	2 theory
	Contact hours (theory, practical)	2 theory
4	Prerequisites/corequisites	
5	Program title	BSc Pharmacy, PharmD
6	Program code	
7	Awarding institution	The University of Jordan
8	School	Pharmacy
9	Department	Pharmaceutical Sciences
10	Level of course	Elective
11	Year of study and semester (s)	5 th year/ 1 st semester
12	Final Qualification	BSc
13	Other department (s) involved in teaching the course	
14	Language of Instruction	English
15	Teaching methodology	<input checked="" type="checkbox"/> Blended <input type="checkbox"/> Online
16	Electronic platform(s)	<input checked="" type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....
17	Date of production/revision	7/9/2021

18 Course Coordinator:

Dr. Areej AbuHammad, office hours: to be announced
Associate Professor Pharmaceutical Sciences
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19 Other instructors:

NA

20 Course Description:

As stated in the approved study plan.

This course introduces the students to the principles of biotechnology and its applications in the pharmaceutical field. It involves detailed discussion of the most recent techniques such as recombinant DNA technology, gene cloning and genetic engineering. Application of such technologies in preparing new biopharmaceutical products (genes and proteins) is approached. Various delivery systems of these bioengineered products are to be addressed; together with the required detection techniques. Gene delivery is to be discussed as a module in the treatment of different genetic disorders.

21 Course aims and outcomes:

A- Aims:

This course introduces the students to the principles of biotechnology and its applications in the pharmaceutical field. It involves detailed discussion of the most recent techniques such as recombinant DNA technology, gene cloning and genetic engineering. Application of such technologies in preparing new biopharmaceutical products (genes and proteins) is approached. Various delivery systems of these bioengineered products are to be addressed, together with the required detection techniques. Gene delivery is to be discussed as a module in the treatment of different genetic disorders

B- Intended Learning Outcomes (ILOs):

Upon successful completion of this course students will be able to

Develop, integrate, and apply knowledge from the foundational sciences in pharmaceutical biotechnology (learner)

1. Demonstrate knowledge on the classification of drugs as biopharmaceuticals, different classes of protein drugs, the principles of rDNA technology and its importance in producing novel therapeutic proteins.
2. Demonstrate understanding of the therapeutic cloning and recognize its therapeutic applications.
3. Demonstrate understanding of recent biotech approaches in human therapy such as monoclonal antibodies, antisense technology and RNA interference technique.
4. Recognize the main concepts and methods utilized frequently in molecular cell biology especially protein characterization as well as the different techniques used to separate macromolecules and their identification

Proactively investigates new knowledge, approaches or behavior and takes steps to evaluate and improve performance (Self-learner)

5. Proactively investigate, collect and interpret information related to therapeutic biotechnology products through browsing the internet based professional web sites, medical guidelines & journal databases (MEDLINE, e-library)

Exhibit behaviours and values that are consistent with the trust given to the profession by patients, other healthcare providers, and society (Professional)

6. Demonstrate integrity by not cheating and not committing plagiarism
7. Demonstrate respect to professors and classmates by observing active listening inside the classroom

22. Topic Outline and Schedule:

Week	Lecture	Topic	Teaching Methods*/platform	Evaluation Methods**	References
1	1.1	Introduction to the course; late registration	'MS Teams		
	1.2	What is pharmaceutical biotechnology	'MS Teams		
2	2.1	Selection of a Therapeutic Protein	MS Teams		Chapter 1-REF 1
	2.2	DNA Sequence	Moodle		Chapter 1-REF 1
3	3.1	Selection of Expression Host	MS Teams		Chapter 1-REF 1
	3.2	CopyDNA	Moodle		Chapter 1-REF 1
4	4.1	PCR	MS Teams		Chapter 1-REF 1
	4.2	Cloning PCR Products into an Expression Vector	Moodle		Chapter 1-REF 1
5	5.1	Agarose gel electrophoresis	MS Teams		Chapter 1-REF 1
	5.2	Transfection of Host Cells	Moodle		Chapter 1-REF 1
6	6.1	Transgenic animals	MS Teams		Chapter 1-REF 1
	6.2	Upstream Processing	Moodle		Chapter 1-REF 1
7	7.1	Expression Systems	MS Teams		Chapter 1-REF 1
	7.2	Downstream Processing Purification Protein Contaminants and Product Variants	Moodle		Chapter 1-REF 1

8	8.1	Protein Structure	MS Teams		Chapter 2-REF 1
	8.2	Protein folding Techniques Specifically Suitable for Characterizing Protein Folding	Moodle		Chapter 2-REF 1
9	9.1	Analytical techniques Blotting Techniques Immunoassays ELISA	MS Teams		Chapter 2-REF 1
	9.2	Electrophoresis Chromatography	Moodle		Chapter 2-REF 1
10	10.1	Regulatory Framework for Biosimilars	MS Teams		Chapter 11-REF 1
	10.2	Gene Therapy	Moodle		Chapter 24-REF 1
11	11.1	Monoclonal antibodies: principle, classes, production and applications	Moodle		Chapter 25 REF1
	11.2	Antisense therapy	Moodle		Specified in each lecture.
12	12.1	Selected New Technologies	Moodle		Specified in each lecture.
	12.2	Selected New Technologies	Moodle		Specified in each lecture.
13	13.1	Selected New Technologies	Moodle		Specified in each lecture.
	13.2	Selected New Technologies	Moodle		Specified in each lecture.
14	14.1	Selected New Technologies	Moodle		Specified in each lecture.
	14.2	Selected New Technologies	Moodle		Specified in each lecture.

15	15.1	Selected New Technologies	Moodle		Specified in each lecture.
	15.2	Selected New Technologies	Moodle		Specified in each lecture.

- Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
- Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz...etc

23 Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	Period (Week)	Platform
Midterm Exam	30		TBA	
Presentation	10	Selected topics	1/5/2020	Moodle
poster Project	5	Selected topics	1/5/2020	
Online activities	5	Selected topics	TBA	Moodle
Final Exam	50		TBA	

24 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform...etc):

Computer
Internet connection
Webcam
MS Teams
MS PowerPoint
MS Word
Mobile Camera

25 Course Policies:

A- Attendance policies:
Attendance: Mandatory.
First warning – with 4 absences
Last warning – with 5 absences
Failing in the subject – with 6 absences
B- Absences from exams and submitting assignments on time:

Will result in zero achievement unless health report or other significant excuse is documented.

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior:

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

Failing the subject he/she cheated at

Failing the other subjects taken in the same course

Not allowed to register for the next semester. The summer semester is not considered as a semester

E- Grading policy:

Mid Exam	30 points
Presentation	10 points
Poster	5 points
Online activities	5 points
Final Exam	50 points
Total	100 points

F- Available university services that support achievement in the course:

library, internet classes

26 References:

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

1. Pharmaceutical Biotechnology: Fundamentals and Applications. Crommelin, D. J.; Sindelar, R. D.; Meibohm, B., 2013.
2. Pharmaceutical biotechnology: an introduction for pharmacists and pharmaceutical scientists, edited by Daan J.A. Crommelin and Robert D. Sindelar, Third Edition
3. Biotechnology and Pharmacy, Ed John M. Pezzuto, Michael E. Johnson, and Henri R. Manasse, Jr. 1993

B- Recommended books, materials and media:

Biopharmaceuticals: Biochemistry and Biotechnology 2nd Edition
Selected papers to be supplied to the students

27 Additional information:

A. Course Material and Announcements: Students need to use the e-learning page at the JU website in order to get all lecture handouts and guidelines which will be uploaded there. In addition, course related announcements and exam results will be posted on the e-learning page and **it is the responsibility of each student to check the site regularly.** Username and password to access the course on the e-learning page will be provided to students in the beginning of the semester.

B. Grievance Policy
According to the general policies applied at the University of Jordan for grievance, when there is a complaint or conflict between a student and an academic/staff member or another student, the following procedures must be followed:

1. The student writes a formal complaint describing the situation of conflict to the Dean of the School or the President of the University.
2. Dean or President will first try to resolve the controversy by meeting/listening to both parties.
3. If agreement was not possible, Dean or president forms an investigation committee which will follow, within a specified timeline, the general policies for relevant circumstances. The following points are considered:
 - a. The committee will meet/talk to both parties and witnesses (if applicable) within two weeks of conflict.
 - b. All meetings and discussions are documented according to the university policies.
 - c. Results/ recommendations will be sent to the Dean or President who is responsible for their implementation

Name of Course Coordinator: Dr. Areej Abuhammad Signature: -- Date: 7/9/2021

Head of Curriculum Committee/Department: ----- Signature: -----

Head of Department: ----- Signature: -----

Head of Curriculum Committee/Faculty: ----- Signature: -----

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