

Course Plan for Bachelor Program - Study Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-4.0E
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Study Plan No.	2021-2022	University Specialization	Bachelor of Pharmacy
Course No.	0201443	Course Name	Pharmaceutical Biotechnology
Credit Hours	3	Prerequisite *Co-requisite	Immunology
Course Type	☐ Mandatory University Requirement ☐ University Elective Requirement	☐ Faculty Mandatory Requirement ☐ Support course family requirements	☒ Mandatory Requirement ☐ Elective Requirement
Teaching Style	☐ Full Online Learning	☐ Blended Learning	☒ Traditional Learning
Teaching Model	☐ 1 Synchronous: 1 Asynchronous	☐ 1 Face to Face: 1 Asynchronous	☒ 2 Traditional

Faculty Member and Study Divisions Information (to be filled in each semester by the subject instructor)

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Name	Academic rank	Office No.	Phone No.	E-mail	
			-		
Office Hours (Days/Time)					
Division number	Time	Place	Number of Students	Teaching Style	Approved Model
				Traditional Learning	2 Traditional

Brief Description

This course equips students with the know-how to analyze molecular-biology foundations, evaluate key recombinant DNA techniques, critique “-omics” data, and assess gene-therapy strategies. Students apply these concepts to optimize protein production, design delivery systems for biotherapeutics, and select the most appropriate biotech medicines for specific clinical cases, ensuring readiness for precision-medicine practice.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc.)	Crommelin, D. J. A., Sindelar, R. D., & Meibohm, B. (Eds.). (2024). <i>Pharmaceutical biotechnology: Fundamentals and applications</i> (6 th ed.). Springer. ISBN 978-3031300226			
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	Strachan, T., & Read, A. (2018). <i>Human molecular genetics</i> (4 th ed.). Garland Science. ISBN 978-0815341499.			
Supporting Websites	-			
The Physical Environment for Teaching	☒ Classroom	☐ Labs	☒ Virtual Educational Platform	☐ Others
Necessary Equipment and Software	Moodle			
Supporting People with Special Needs	-			
For Technical Support	E-Learning & Open Educational Resources Center Email: ellearning@zu.edu.jo ; Phone: +962 6 429 1511 ext. 425/362			

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Course learning outcomes (K= Knowledge, S= Skills, C= Competencies)

No.	Course Learning Outcomes	The Associated Program Learning Output Code
Knowledge		
The student should be able to:		
K1	Analyse the foundational concepts of molecular biology and their applications in recombinant DNA technology and protein formulation.	MK1
K2	Evaluate key molecular techniques such as PCRs, microarray sequencing, and reverse transcription in the context of recombinant DNA technology.	MK2
Skills		
The student should be able to:		
S1	Analyse factors that influence protein production, purification, and formulation using recombinant DNA techniques.	MS4
S2	Design solutions for challenges related to the formulation and delivery of therapeutic proteins.	MS2
S3	Assess the potential of gene therapy in managing and treating genetic disorders.	MS2
Competencies		
The student should be able to:		
C1	Critique the contributions of genomics, proteomics, transcriptomics, and pharmacogenomics to drug-target discovery and treatment response.	MC1
C2	Select the most appropriate biotechnology-derived therapeutic option for a given patient scenario, based on current clinical guidelines.	MC3

Mechanisms for Direct Evaluation of Learning Outcomes

Type of Assessment / Learning Style	Fully Electronic Learning	Blended Learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm Exam	30%	30%	30%	0%
Participation / Practical Applications	0%	0%	30%	60%
Asynchronous Interactive Activities	30%	30%	0%	0%
Final Exam	40%	40%	40%	40%

Note 1: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, and work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

Note 2: According to the Regulations of granting Master's degree at Al-Zaytoonah University of Jordan, 40% of final evaluation goes for the final exam, and 60% for the semester work (examinations, reports, research or any scientific activity assigned to the student).

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Schedule of Simultaneous / Face-to-Face Encounters and their Topics

Week	Subject	Learning Style*	Reference ** (Pages in Course Book)
1	Nucleic acids: Structure, function and DNA Replication	Lecture, Interactive Model Assimilation Video	19-36 from SLR (2)
2	Gene Expression: Transcription and Translation	Lecture	75-106 from SLR (2)
3	Protein structure Post Translational Modification	Lecture	13-33 from SLR (1)
4	Mutations and Genetic Variations Assignment 1	Lecture	28-36/94-100 SLR (2)
5	What is Pharmaceutical Biotechnology? PCR and Gel Electrophoresis qPCR, and RT-PCR	Lecture	1-11 SLR (1) 43-48 from SLR (1)
6	Genomic and Transcriptomic Analysis Techniques: DNA Microarray Technique DNA sequencing	Lecture	1-19 145-150 SLR (2)
7	Recombinant DNA technology (rDNA)	Lecture	37-53 from SLR (1) 107-152 from SLR (2)
8	Production, Formulation and Delivery of Biopharmaceuticals	Lecture	57-80
9	Midterm exam		
10	Genomics, Transcriptomics, Proteomics, and Pharmacogenomics	Lecture Worksheet	57, 218-222, 464 Ref in ppt
11	Personalised Medicine	Lecture Debate	Ref in ppt
12	Gene Editing and Gene Therapy	Lecture Exit Slips	215-218, 315-316 339-349
13	Advances in Pharmaceutical Biotechnology for Disease Treatment: mABs, and vaccines	Lecture	151-190 281-304
14	Examples of biotechnology-based drug development	Lecture	Ref in ppt
15	Approved Protein Therapeutics and Their Biochemical Action (Assignment 2)	Student - Based Presentation	
16	Final Exams		

* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.

Schedule of Asynchronous Interactive Activities (in the case of e-learning and blended learning)

Week	Task / Activity	Reference	Expected Results
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