Faculty: Pharmacy	
Department: Pharmaceutical Sciences	**Program: Master**
Academic year:	**Semester:**

Course Plan

First: Course Information

Course Title:	**Pharmaceutical Biotechnology**			***Course No. 1101709***	
Credit Hours:	***3***	***Theoretical:***	***3***	***Practical:***	***0***
Prerequisite:		***Section No.:***		***Lecture Time:***	
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 + 1 Asynchronous)*** ☐ ***Online Learning (2 Synchronous + 1 Asynchronous)***				

Second: Instructor's Information

Course Coordinator:			
Name:		***Academic Rank:***	
Office Number:		***Ext. Number:***	***E-mail:***
Course Instructor:			
Name:		***Academic Rank:***	
Office Number:		***Ext. Number:***	***E-mail:***
Office Hours:	***Sunday Monday Tuesday Wednesday Thursday***		

Third: Course Description

This course is designed to acquaint students with the field of biotechnology including historical development, current technologies and future trends. The course is concerned with the methods used in drug modification, cell targeting and cell engineering to develop new therapies that can be applied in different disease state. The student is expected to get the basic knowledge and information about the commonly used techniques in cell modifications, and genetic engineering. The course will also examine the ethical implications of biotechnology and genetic engineering.

Fourth: Course objectives

1. To introduce the student to the principles of biotechnology and its applications in the pharmaceutical field
2. To learn the most common techniques as recombinant genetic engineering, immune system utilization and nanotechnology, and to utilize them in the preparation of new pharmaceutical products
3. To study the different delivery systems of bioengineered products and their detection techniques
4. To introduce the student to the gene therapy in different genetic disorders.

Fifth: 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**	Understand the basic principle of biotechnology, and genetic manipulation in the generation of new drugs	P. K1	Mid-term exam Final exam	50	25 (50%)
Skills	**S1**	Choose the most suitable method for attaining the desired gene-phenotype effectively.	P. S1	Mid-term exam Final exam	40	20 (50%)
Competencies	**C1**	Develop the skills necessary for self-managed learning (time management and organization skills).	P. C3	Assignments Group presentation	10	5 (50%)

*For each CILO, the PILO could be the same or different.

Sixth: Learning Source

Main Reference:	Concepts in Pharmaceutical Biotechnology and Drug Development		
Author: Sankhadip Bose, Amritesh Chandra Shukla, Mirza R. Baig, Sabyasachi Banerjee	***Issue No.: NA***	***Print: Springer***	***Publication Year: 2024***
Additional Sources &Websites:	• *Textbook of pharmaceutical biotechnology 2011. Chandrakant Kokate Pramod H.J* • Biotechnology. 5th ed. Smith, John E.2009 • Lippincott's Illustrated Reviews: Biochemistry Fifth Edition: chapter 33: biotechnology and human diseases: pages 465- 487. • Pharmaceutical Biotechnology Fundamentals and Applications: Daan J. A. Crommelin • Robert D. Sindelar Bernd Meibohm. 2019. • Hugo and Russell's Pharmaceutical Microbiology. SEVENTH EDITION. Chapter 24: Pharmaceutical biotechnology: pages 416 – 440. • Websites		
Teaching Type:	■ ***Classroom*** ☐ ***Laboratory*** ☐ ***Workshop*** ☐ ***MS Teams*** ■ ***Moodle***		

Seventh: Course Structure

Lecture Date	Intended Teaching Outcomes (CILOs)	Topics	Teaching Procedures*	Teaching Methods**	References***
	K1, S1	Introduction and course outline overview	Face-to-Face	Discussion	Course outline
	K1, S1	Development of Nanoparticles: Recent Developments and Future Prospects	Blended Learning	Power point presentations Discussion	Pages 67-89
	K1, S1	Production of Biopharmaceuticals on Genetically Modified Organisms	Face-to-Face	Power point presentations Discussion	Pages 91-101
	K1, S1	Drug Delivery in Biotechnology: Present and Future	Blended Learning	Power point presentations Discussion	Pages 103-138
	K1, S1	Transgenesis: In the Drug Discovery Process, Including	Face-to-Face	Power point presentations Discussion	Pages 159-187

		Target Identification and Target Validation			
	K1, S1	Role of Genomics and Proteomics in Drug Discovery	Blended Learning	Power point presentations Discussion	Pages 207-246
		Mid-term exam			
	K1, S1	Gene Therapy in Molecular Biology and Drug Delivery	Face-to-Face	Power point presentations Discussion	Pages 279-296
	K1, S1	Biotechnological Approaches in Infectious Diseases	Blended Learning	Power point presentations Discussion	Pages 297-317
	K1, S1	Artificial Intelligence in Drug Discovery and Development	Face-to-Face	Power point presentations Discussion	Pages 363-385
	K1, S1	Application of Biotechnology for Raw Material Analysis	Blended Learning	Power point presentations Discussion	Pages 21-29
	K1, S1	Application of Biotechnology in Pharmaceutical Manufacturing Control	Face-to-Face	Power point presentations Discussion	Pages 31-42
	K1, S1	Applications of Biotechnology in Pharmaceutical Product Analysis	Blended Learning	Power point presentations Discussion	Pages 43-66
		Final Exam			

Teaching procedures: (Face-to-face, synchronous, asynchronous). * * Teaching methods: Lecture, video…..). ***
Reference: Pages of the book, recorded lecture, video….)

Eighth: Assessment methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Specific Course Output to be Assessed *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	S1	C1
Mid-term Exam			30	**30**		
Final Exam			50	**20**	**30**	
Quizzes						
Assignments			10		**10**	
Group presentation			10			**10**
Total out of 100			100	**50**	**40**	**10**

***Refer to document (CC-2023-03)**

Ninth: Course Policies

- 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			