



Jerash University

Faculty of Pharmacy
Department of Pharmaceutical Sciences

(Course Syllabus)

Subject Name	Credit Hours	Course No.	Prerequisite
Pharmaceutical Biotechnology	3	1101333	1101332

Coordinator Name	Lecturer/s	Room No.	E-mail	Office Hours	Lecture time
Dr. Haitham Tumah	Dr. Haitham Tumah	403	haithamtu@yaho.com	Check the schedule	M+W 08:00-09:30

Course Objectives:

Upon successful completion of this course the students should be able to:

1. develop an appreciation of recombinant DNA technology and explain the principles that form the basis for this technology.
2. describe the common methods and applications of biotechnology with regards to synthesis of therapeutic agents and gene therapy
3. acknowledge both sides of the ethical implications of biotechnology

Course Description:

- The course will provide demonstrations of the structure and function of DNA, RNA, chromosomes, and genes.
- This course also provides a definition and an introduction to biotechnology and its application in a variety of pharmaceutical, medical, clinical and science disciplines. Topics covered include various techniques in biotechnology, microbiology techniques, DNA techniques and their applications in the manufacturing of biopharmaceuticals and biomedical research. Examples of real-world applications will be included. It also describes the use of genetically engineered products to improve human health.

Intended Learning Outcomes :

Successful completion of this course should lead to the following learning outcomes :

- The information passed from parents to offspring is coded in DNA molecules.
- Genes are segments of DNA molecules. Inserting, deleting, or substituting DNA segments can alter genes. An altered gene may be passed on to every cell that develops from it.
- Biotechnology has contributed to health improvement in many ways, but its cost and application have led to a variety of controversial social and ethical issues.
- The rationale and theory behind common techniques in the biotechnology field and use them to

- solve problems routinely encountered in the biotech industry.
- How the immune system works and how this influences the development of recombinant DNA therapeutics
- Modern therapeutics derived from the application of genetic techniques are often difficult to produce and handle but are highly specific for their biological sites of activity.

Course Contents :

Week	Topics	topic details	Chapter in textbook
1.	Introduction From DNA to proteins	Definition, Timeline, application A. Prokaryotes and eukaryotes macromolecules <ul style="list-style-type: none"> • Nucleic acids structure 	Chapter 1 Chapter 2
2.	From DNA to proteins	B. DNA replication <ul style="list-style-type: none"> • Replication process 	Chapter 2
3.	From DNA to proteins	C. Genetic code D. Transcription E. Translation	Chapter 2
4.	From DNA to proteins	F. Regulation of gene expression <ul style="list-style-type: none"> • Prokaryotic gene expression • Eukaryotic gene expression 	Chapter 2
5.	Recombinant DNA technology	A. Cutting and joining DNA B. Separating restriction fragments and visualizing DNA	Chapter 3
6.	Recombinant DNA technology	C. DNA cloning D. Cloning vectors	Chapter 3
7.	Recombinant DNA technology	E. Cell transformation F. Constructing and screening library	Chapter 3
8.	Recombinant DNA technology	G. Southern blot hybridization H. Polymerase chain reaction I. DNA sequencing	Chapter 3
9.	Microbial biotechnology Animal biotechnology	A. Over view about microial biotechnology and industrial fermenters gene B. Transfer methods in animals C. Transgenic animals and their application	Chapter 5 Chapter 7
10.	Genomics and beyond	Human genome project	Chapter 9
11.	Medical Biotechnology	A. Gene therapy B. Clinical trials	Chapter 10
12.	Medical Biotechnology	C. Recent gene therapy success D. New approaches to gene therapy	Chapter 10
13.	Medical Biotechnology	E. Virotherapy F. Stem cells	Chapter 10
14.	Medical Biotechnology	G. Vaccines H. Tissue engineering	Chapter 10
15.	Medical Biotechnology	I. Xenotransplantation Product of biotechnology	Chapter 10 Chapter 19
16.	FINAL EXAMINATION WEEK		

Grade Distribution :

Assessment	Grade	Date
- First Exam	20	
- Second Exam	20	
- Assignments (reports, quizzes, homeworks, participation, conduct)	20	

Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.

Main Reference: *Biotechnology An Introduction. Susan R. Barnum. Second Edition. 2005*

Other References:

1. *Daan J A Crommelin and Robert D Sindelar, Pharmaceutical Biotechnology. Second edition 2005*
2. *Tortora-Funk-Case, Microbiology, An Introduction- 11th edition 2013*
3. *Pharmaceutical Dosage Form and Drug Delivery System. Loyd V. Allen Jr. 2014_C 26*