



Course specification
2020- 2021
Faculty of Pharmacy
Mansoura University



Level five

Course specification of Pharmaceutical
Biotechnology

University: Mansoura
Faculty : Pharmacy
Department : Microbiology and Immunology
Course title: Pharmaceutical Biotechnology

Program on which the course is given	B. Pharm
Academic Level	Fifth Level, semester one
Date of course specification approval	9/9/2020

1- Basic Information : Course data :

Course title:	Pharmaceutical Biotechnology	Code: PM526 PM526	
Specialization:	Pharmaceutical Courses		
Prerequisite:			
Teaching Hours:	Lecture: 2	Practical: 1	
Number of units: (credit hours)	3		

2- Course Aims:

On completion of the course, the student will be able to describe the different concepts of fermentation and industrial microbiology, describe the different concepts of genetic engineering, PCR, mutation, mutagen, recombinant DNA technology and gene therapy, and describe different means of getting rid of wastes and pollutants, bioremediation and bioconversion of wastes and other cheap under-utilized material to produce certain useful pharmaceuticals.

Intended learning outcomes (ILOs):

a- Knowledge and understanding

a1	Describe the role of genomics and biotechnology in the discovery of new remedies.
a2	Explain the principles of bioremediation and genetic engineering.
a3	Know the applications of genetic engineering in pharmaceutical industry.

b- Intellectual skills

b1	Outline the different substances produced by microorganisms
b2	Analyze how to encode and transfer regions of the genetic material of the microorganisms.
b3	Apply how biotechnology exploits the diversity of the microbial world in the production of drugs



c- Professional and practical skills

c1	Manage pharmaceutical instruments and equipment safely and efficiently.
c2	Solve commonly encountered problems in pharmaceutical manufacturing processes.
c3	Isolate and identify antibiotics producing microorganisms from the soil and determine the antibiogram of the produced compounds
c4	Clone the encoding regions and transfere them to bacteria.

d- General and transferable skills

d1	Work effectively in team.
d2	Communicate effectively in a scientific language.
d3	Adopt professional ethical, legal and safety guidelines in pharmacy practice

3- Contents:-

Week No	Topics	No.of hours	Lecture (hr.)	Practical
1.	Introduction to biotechnology, fermentation and industrial microbiology.	2	2 hr	
2.	Industrial microorganisms and fermentation media.	2	2	
3.	Fermentation techniques, fermenters and bioreactors.	2	2	
4.	Fermentation upstream and downstream processes.	2	2	
5.	Applications of fermentation process.	2	2	
6.	Bioremediation and bioleaching.	2	2	
7.	Week 7 Mid-term	-	-	
8.	Introduction to microbial genetics: DNA and RNA structure and function.	2	2	
9.	Types of RNA, Genetic code, Protein synthesis and methods of DNA transfer.	2	2	
10.	Cloning, DNA mutation and repair. PCR and DNA sequencing methods.	2	2	
11.	Genetic engineering and gene therapy. Applications of genetic engineering and gene therapy. Revision/Open discussion	2	2	
12.	Week 12 Practical exam			
13.	Week 13-15 Final written & oral			
	Practical topics			
1.	Introduction to biotechnology and fermentation.	2		1



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2.	Shake flask fermentation.	2		1
3.	Fermenter.	2		1
4.	Isolation of soil bacteria.	2		1
5.	Identifying antibiotic producing microorganisms from soil.	2		1
6.	Assessment of antimicrobial production from the soil isolates.	2		1
7.	Mid Term			
8.	Mutation.	2		1
9.	Polymerase chain reaction (PCR).	2		1
10.	Cloning.	2		1
11.	Western blotting.	2		1
12.	Week 12 Practical exam	2		1

4- Teaching and learning Methods:

5.1	Lectures using white, video illustrations and data show.
5.2	Practical session using laboratory equipment (Microscopes and glass wares).
5.3	Research assignments.
5.4	Case study.

5- Student Assessment:

a- Assessment methods:

1-Written exam	To assess understanding, intellectual, and professional skills.
2-Practical exam	To assess professional and practical skills.
3-Oral	To assess Knowledge, understanding, intellectual skills, general skills and confidence.
4-Case study	To assess the skills of problem-solving and date presentation.

b- Assessment schedule

Assessment 1	Practical	13 th week
Assessment 2	Mid-term	7 th week
Assessment 3	Oral	15 th week
Assessment 4	Written	15 th week



c- Weighting of assessments:

1	Mid-term examination	10 %
2	Final-term examination	50 %
3	Oral examination	15 %
4	Practical examination & Semester work	25 %
Total		100%

6 - List of References

N0.	Reference	type
1	Fundamentals of Biotechnology, 2009	Book
2	Molecular biology and biotechnology 5 th edition, 2012	Book
3	http://www.ms-biotech.wisc.edu/biotech-websites.cfm	Website
4	http://biotechlearn.org.nz/	Website
5	Lectures notes prepared by staff members	Course notes

7- Matrix of knowledge and skills of the course

No	Course contents	Study Week	ILOS			
			Knowledge & understanding	Intellectual skills	Professional and practical skills	General & transferable skills
1.	Introduction to biotechnology, fermentation and industrial microbiology.	1	a1,a2	b1	c1	d2
2.	Industrial microorganisms and fermentation media.	1	a1,a2	b1, b2	c1	d2, d3
3.	Fermentation techniques, fermenters and bioreactors.	1	a1, a2,a3	b1, b2	c1, c2	d1, d2, d3
4.	Fermentation upstream and downstream processes.	1	a2,a3	b2, b3	c3, c4	d2, d3
5.	Applications of fermentation process.	1	a1, a2,a3	b1, b2, b3	c1, c2, c3, c4	d2, d3
6.	Bioremediation and bioleaching.	1	a2,a3	b2, b3	c2, c3, c4	d1, d2, d3
7.	Introduction to microbial genetics: DNA and RNA structure and function.	1	a1,a2	b1, b2	c1, c2	d2
8.	Types of RNA, Genetic code, Protein synthesis and methods of DNA transfer.	1	a1,a2	b1, b2	c1, c2	d2
9	Cloning, DNA mutation and repair.	1	a1,a2	b1, b2	c1, c2	d1, d2, d3
	PCR and DNA sequencing					



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	methods.					
11	Genetic engineering and gene therapy.	1				
	Applications of genetic engineering and gene therapy. Revision/Open discussion		a1, a2,a3	b1, b2, b3	c1, c2, c3, c4	d1, d2, d3

Course Coordinator:	Dr Eman Salama
Head of department:	Professor Dr. El-sayed Habeb