



1.	Course title	Biotechnology
2.	Course number	0304383
3.	Credit hours (theory, practical)	(3,0)
	Contact hours (theory, practical)	(3,0)
4.	Prerequisites/co-requisites	General Microbiology 0304341
5.	Program title	B.Sc. of Biological Sciences
6.	Year of study and semester (s)	3rd year level
7.	Final Qualification	B.Sc.
8.	Other department (s) involved in teaching the course	None
9.	Language of Instruction	English
10.	Date of production/revision	Sep. 24, 2017 / Feb 14, 2019
11.	Required/ Elective	Required for Biological Sciences majors, and elective for Medical and Laboratory Analysis majors

12. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Mamoon M.D. Al-Rshaidat

Office Room: *Biological Sciences Building, Room 314*

Office Hours: *Monday and Wednesday 9:30 -10:30 or by appointment via email.*

Phone Number: *Ext. 22221*

Email: *m.rshaidat@ju.edu.jo Please write **BIOTECHNOLOGY** in the email subject line*

13. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

N/A

14. Course Description:

As stated in the approved study plan.

The course introduces both principles and application of recombinant DNA technology to microbes, animals and plants in the hope of using genetically engineered products to clear the environment and improve human health prospects. This would be achieved through tackling the history of biotechnology, basic principles of recombinant DNA technology, common methods of applications of animals, human, and medical biotechnology. Common methods of applications of plant biotechnology. Methods of applications of microbial and environmental biotechnology. Ethical issues of biotechnology and patenting. Current societal issues in biotechnology and bioethics.



15. Course aims and outcomes:

A- Aims:

The course aims at:

1. Having the students acquire basic concepts in biotechnology
2. Familiarize the students with the basic principles and applications of recombinant DNA technology
3. Familiarize the students with the fields of biotechnology (microbial, plant, animals, human, and medical biotechnology)
4. Introduce the students to the applications of microbial and environmental biotechnology
5. Introduce the students to ethical issues related to biotechnology
6. Introduce the students to patents, with focus on medical patents
7. Familiarize the students with the current societal issues in biotechnology and bioethics.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to:

1. Demonstrate knowledge and understanding in biotechnology
2. Describe the molecular and cellular basis of biotechnology
3. Discuss the main techniques of molecular analysis and genetic modification
4. Describe the theory, practice and potential of specific biotechnologies
5. Demonstrate an appreciation of biotechnology in industry and business
6. Describe and begin to evaluate aspects of current research and applications in biotechnology

16. Topic Outline and Schedule:

Topic	Week	ILOs	Program SOs	ABET SOs	TLA (teaching, learning and Assessment)
Introduction to Course	1	1			
Ch. 2: An Introduction to Genes and Genomes 2.1 Assignment (read alone): A Review of Cell Structure 2.2 Assignment (read alone): The Molecule of Life 2.3 Chromosome Structure, DNA Replication, and Genomes 2.4 RNA and Protein Synthesis 2.5 Mutations: Causes and Consequences 2.6 Revealing the Epigenome	2	2			
Ch. 3: Recombinant DNA Technology and Genomics 3.1 Introduction to Recombinant DNA Technology and DNA Cloning 3.2 What Makes a Good Vector?	3	2,3			



3.3 How Do You Identify and Clone a Gene of Interest?					
Continue... 3.4 What Can You Do with a Cloned Gene? Applications of Recombinant DNA Technology 3.5 Genomics and Bioinformatics: Hot New Areas of Biotechnology	4	-			
Ch. 4: Proteins as Products 4.1 Proteins as Biotechnology Products 4.2 Protein Structures 4.3 Protein Production: Protein Expression: Upstream Processing Protein Purification Methods: Downstream Processing Protein Verification, Preserving Scaling Up Protein Purification Post-purification Analysis Methods 4.4 Proteomics Protein Microarrays	5	4, 5, 6			
Midterm Exam	6				
Ch. 5: Microbial Biotechnology 5.1 The Structure of Microbes 5.2 Microorganisms as Tools 5.3 Using Microbes for a Variety of Everyday Applications 5.4 Vaccines	7	3, 4, 5, 6			
Ch. 5: Microbial Biotechnology 5.1 Microbial Genomes 5.2 Microbes for Making Biofuels 5.3 Microbial Diagnostics 5.4 Combating Bioterrorism	8	3, 4, 5, 6			
Ch. 9: Bioremediation 9.1 What Is Bioremediation? 9.2 Bioremediation Basics 9.3 Cleanup Sites and Strategies 9.4 Applying Genetically Engineered Strains to Clean Up the Environment 9.5 Environmental Disasters: Case Studies in Bioremediation 9.6 Challenges for Bioremediation	9				
Ch. 6: Plant Biotechnology 6.1 The Future of Agriculture: Plant Transgenics 6.2 Methods Used in Plant Transgenesis - Conventional Selective	10	3, 4, 5, 6			



Breeding - Cloning: Growing Plants from Single Cells - Antisense Technology 6.3 Practical Applications 6.4 Health and Environmental Concerns					
Ch. 7: Animal Biotechnology 1.1 Introduction to Animal Biotechnology 1.2 Animals in Research 1.3 Cloning 1.4 Transgenic Animals 1.5 Producing Human Antibodies in Animals	11	3, 4, 5, 6			
Ch. 11: Medical Biotechnology 11.1 The Power of Molecular Biology: Detecting and Diagnosing Human Disease Conditions 11.2 Medical Products and Applications of Biotechnology	12	3, 4, 5, 6			
<i>Continue Ch. 11</i> Biotechnology Revolution (BBC) Video	13	-			
<i>Continue Ch. 11</i> 11.3 Gene Therapy 11.4 The Potential of Regenerative Medicine	14	-			
Ch. 13: Ethics and Biotechnology 13.1 What Is Ethics? 13.2 Ethic and Biotechnology 13.3 Economics, The Role of Science, and Communication	15	5, 6			

17. Evaluation Methods and Course Requirements (Optional):

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

Evaluation criteria #1: Punctuality

This evaluation will be based on assignments given to students, with a primary purpose of emphasizing the importance of deadlines and the ability to organize their schedule to fulfill these deadlines. This includes preparation before coming to class, and being punctual in attendance without being late. Online quizzes and assignments were delivered through the online e-learning portal and emphasized the punctuality.

Evaluation criteria #2: Quizzes and assignments



Short exam and assignments throughout the semester to test the student's preparation and following up with the taught material. Multiple-choice questions of the comprehensive, application, analytical, and knowledge type criteria. Total (30%)

Evaluation criteria #4: Written exams

Based on questions of the comprehensive, application, analytical, and knowledge type criteria. Two exams will be evaluated; Midterm exam (30%), and Final Exam (40%)

18. Course Policies:

A- Attendance policies:

Attendance is required, and students missing some of the 1-hour classes will jeopardize their successful completion of the course, due to the discussion nature of the course and the key elements discussed during the course that cannot be found in the textbook. Also, students are required to refer to Student Handbook for questions related to attendance and absence.

B- Absences from exams and handing in assignments on time:

According to the University of Jordan regulations, refer to student handbook

المادة (17): أ- كل من يتغيب بعذر عن امتحان معلن عنه باستثناء الامتحان النهائي، عليه أن يقدم ما يثبت عذره لمدرس المادة خلال ثلاثة أيام عمل من تاريخ زوال العذر، وفي حالة قبول مدرس المادة لهذا العذر فعليه إجراء امتحان معوض للطالب وإذا لم يقبل مدرس المادة العذر تعتبر عالمته صفراً، في هذا الامتحان.

C- Health and safety procedures:

Although this course has no laboratory component, health and safety is emphasized throughout the course due to the nature of topics discussed. This is mainly related to working with human, animal and plant objects, and the health and safety concerns related to the consumption of genetically modified products or additives.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

According to The University of Jordan regulations. Students shall refer to Student Handbook for questions related to cheating and plagiarism.

E- Grading policy + Weighting (i.e. weight assigned to exams as well as other student work)

Midterm exam	30%
Quizzes and assignments	30%
Final exam	40%

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

E-Learning portal, and online resources from the e-library to access scientific literature.

G- Statement on Students with disabilities

Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor and/or their academic advisor as soon as possible. In order to receive accommodations for academic work in this course, students must inform the course instructor and/or their academic advisor, preferably in a written format, about their needs no later than the 4th week of classes.



19. Required equipment:

- Classroom equipped with a data show, projector screen, whiteboard
- Online interactive portal, represented by E-Learning

20. References:

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

“Introduction to Biotechnology, 3rd Edition” by Thieman, W.J and Palladino M.A., Pearson Education, ©2014. ISBN: 0-321-76611-3

B- Recommended books, materials, and media:

Articles, Videos and other material will be provided to students through the online portal (E-Learning)

21. Additional information:

N/A

Date: -----

Name of Course Coordinator: **Dr. Mamoon M.D. Al-Rshaidat** Signature: -----

Head of curriculum committee/Department: ----- Signature: -----

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

Head of curriculum committee/Faculty: ----- Signature: -----

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

Copy to:

Head of Department

Assistant Dean for Quality Assurance

Course File