

## Course Syllabus

1	Course title	Food Biotechnology
2	Course number	0603442
3	Credit hours	2 credit hours
	Contact hours (theory, practical)	(1,3) / week
4	Prerequisites/corequisites	General Microbiology (0603301)
5	Program title	Human Nutrition and Food Science and Technology
6	Program code	42
7	Awarding institution	The University of Jordan
8	School	School of Agriculture
9	Department	Nutrition and Food Technology
10	Level of course	Third year
11	Year of study and semester (s)	First, second and summer semesters
12	Final Qualification	
13	Other department (s) involved in teaching the course	
14	Language of Instruction	English
15	Date of production/revision	2020

### 16 Course Coordinator:

Name: Prof. Hamzah Al-Qadiri  
Office number: 57  
Phone number: 22466  
Email: h.qadiri@ju.edu.jo

### 17 Other instructors:

Name: Dr. Malik Haddadeen  
Office number:  
Phone number: 22422  
Email:

### 18 Course Description:

As stated in the approved study plan.

General definition of biotechnology and developments in food biotechnology; principles of fermentations, genetic engineering cloning and other modern techniques of biotechnology; introducing the use of biotechnology in the production of fermented foods, production of enzymes, vitamins and proteins, and treatment of food plants wastes; tools of modern food biotechnology

## 19 Course aims and outcomes:

### A- Aims

Upon completion of this course, the student is expected to:

- A-1: Understand the definition and duties of molecular biotechnology
- A-2: Describe the applied methods of biotechnology
- A-3: Have advanced knowledge about production of microbial substitutes
- A-4: Discuss the relationship between unit operations and biotechnological activities
- A-5: Understand design and properties of different bioreactors that are used in biotechnology
- A-6: Focus primarily on some of the most important aspects of food in waste bioconversion
- A-7: Understand the basic concepts of molecular cloning and their applications in food and nutrition
- A-8: Recognize the importance of biotechnology in the production of vitamins, growth factors, hormones and amino acids
- A-9: Understand the basic concepts of transgenesis in animals and plants and their use, as well as genetically modified food

### B- Intended Learning Outcomes (ILOs):

Upon successful completion of this course, students will be able to:

- B-1: Realize the basic concept of biotechnology and molecular cloning
- B-2: Know the principle and the mechanism of food examination by biotechnical methodologies
- B-3: Understand the major steps in running a project in biotechnology for production of food substitutes and modification of food functional properties
- B-4: Understand the role and the effect of different unit operations on finished biotechnical products.
- B-5: Select the right design of bioreactors to run biotechnology projects
- B-6: Appreciate the importance of bioconversion process of food wastes
- B-7: Construct and establish biotechnology project in the field of molecular cloning

### *Core academic skills:*

At the end of this course, students are expected to:

- C-1: Gain knowledge and skills on controlling the operational conditions of biotechnology
- C-2: Gain knowledge and skills about scientific research methods of preparing raw materials, biocatalysts, microbes, sample analysis
- C-3: Illustrate the basic operations like O<sub>2</sub> transfer, mass transfer, viscosity, heat transfer etc. in biotechnology.

### *Personal and key skills:*

At the end of this course, students are expected to know how to :

- D-1: Select and construct different bioreactors
- D-2: Propagate biocatalysts for biotechnology
- D-3: Propose the steps and techniques in the production of food substitutes.
- D-4: Relate the concepts of biotechnology and the needs in industry.
- D-5: Identify areas in biotechnology to be used in improving the efficiency of the conventional processing operations.

## 20. Topic Outline and Schedule:

Week	Lecture	Topic	Evaluation Methods**	References
1	1.1	Biotechnology definition and overview	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	1.2			
	1.3			
2	2.1	Microbial technology	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	2.2			
	2.3			
3	3.1	Primary and secondary metabolites	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	3.2			
	3.3			
4	4.1	Strain selection	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	4.2			
	4.3			
5	5.1	Strain improvement of industrial MO	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	5.2			
	5.3			
6	6.1	Methods of fermentation and bioreactors	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	6.2			
	6.3			
7	7.1	Downstream processing	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	7.2			
	7.3			
8	8.1	Probiotic development and medical uses	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	8.2			
	8.3			
9	9.1	Genetically modified food	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	9.2			
	9.3			
10	10.1	Microbial insecticides, microbial polymer	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	10.2			
	10.3			
11	11.1	Nanobiotechnology	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	11.2			
	11.3			
12	12.1	Protein production, hormones, gene	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N.
	12.2			

	12.3	engineering		2012. Biotechnology
13	13.1	Biotech ethics, regulation, public concerns	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	13.2			
	13.3			
14	14.1	Environment biotechnology, biofuels, microbial fuel cells	Exam, Quizzes, Assignments	Clark, D. and Pazdernak, N. 2012. Biotechnology
	14.2			
	14.3			

- Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
- Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz...etc

### 21 Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	Period (Week)
<b>Midterm Exams I</b>	20	1- 5	Throughout the course
<b>Midterm Exams II</b>	20	6-10	Throughout the course
<b>Homework assignments and quizzes</b>	20		Every week throughout the course
<b>Final Exam</b>	40	1-14	To be assigned by the registration

**22 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform...etc):**

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### 23 Course Policies:

- Attendance policies:  
According to the regulations applied at The University of Jordan.

B- Absences from exams and handing in assignments on time:  
According to the regulations applied at The University of Jordan.

D- Honesty policy regarding cheating, plagiarism, misbehavior:  
According to the regulations applied at The University of Jordan.

E- Grading policy:

According to the regulations applied at The University of Jordan.

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

According to the regulations applied at The University of Jordan.

## 24 References:

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

\*\*\*Clark, D. and Pazdernak, N. 2012. Biotechnology\*\*\*

B- Recommended books, materials and media:

Glazer, A.N. and Nikaido, H. 2012. Microbial Biotechnology: Fundamentals of Applied Microbiology, 2nd edition

Peter, M (ed). 2012. Advances in Applied Biotechnology

Smith, J. E. Biotechnology. 2009. Cambridge University Press. Fifth edition

Saxina, S. Applied Microbiology. 2015. Springer India

Sasson, A. (ed). 2005. Industrial and Environmental Biotechnology: Achievements, Prospects, and Perceptions. UNU-IAS Report.

Walsh, G. 2007. Pharmaceutical Biotechnology Concepts and Applications. John Wiley & Sons Ltd

Madigan, J., and Martinko, M. J. Brock Biology of Microorganisms, 13th ed. 2015 and 15th ed. 2018 Prentice Hall.

Internet :

- American Society for Microbiology (ASM) ([www.asm.org](http://www.asm.org))
- American Public Health Association (APHA) ([www.apha.org](http://www.apha.org))
- World Health Organization (WHO) ([www.who.org](http://www.who.org))

## 25 Additional information:

Suggested topics for presentations

1. Biofuel and microbial fuel cells
2. Vaccines and monoclonal antibodies
3. Bioremediation and biodegradation of xenobiotics
4. Antibiotics
5. Gene therapy
6. Insulin, glucagon, and growth hormone
7. Enzymes and immobilization
8. Microbial insecticides
9. Microbial polymers
10. Transgenesis in animals and plants

Name of Course Coordinator: Prof. Hamzah Al-Qadiri Signature: -----Date: December 15, 2020

Head of Curriculum Committee/Department: ----- Signature: -----

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

Head of Curriculum Committee/Faculty: ----- Signature: -----

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