

Course E-Syllabus

1	Course title	Biotechnology of Microorganisms
2	Course number	0304924
3	Credit hours	3 hrs
	Contact hours (theory, practical)	Theory
4	Prerequisites/corequisites	
5	Program title	PhD In Biological Sciences
6	Program code	
7	Awarding institution	
8	School	School of Science
9	Department	Department of Biological Sciences
10	Level of course	PhD
11	Year of study and semester (s)	Second Semester 2021
12	Final Qualification	
13	Other department (s) involved in teaching the course	
14	Language of Instruction	English
15	Teaching methodology	X <input type="checkbox"/> Blended <input type="checkbox"/> Online
16	Electronic platform(s)	X <input type="checkbox"/> Moodle X <input type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....
17	Date of production/revision	

18 Course Coordinator:

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19 Other instructors:

Name:
Office number:
Phone number:
Email:

Name:
Office number:
Phone number:
Email:

20 Course Description:

This course deals with the fundamentals of molecular biotechnology to include molecular research procedures and manipulation of gene expression. Use of microbial systems for commercial products synthesis i.e. pharmaceutical proteins, antibiotics, biopolymers, vaccines and therapeutic agents, bioremedations, and biocontrol agent development. Transgenesis in animals and plants and their use, genetically modified food.

21 Course aims and outcomes:

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

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

22- Intended Learning Outcomes (ILOs):

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

Subject specific skills:

At the end of this course, students will be able to:

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

1. Gain knowledge and skills on controlling the operational conditions of biotechnology
2. Gain knowledge and skills about scientific research methods of preparing raw materials, biocatalysts, microbes, sample analysis
3. Illustrate the basic operations like O₂ 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 :

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

22. Topic Outline and Schedule:

Week	Lecture	Topic	Teaching Methods*/platform	Evaluation Methods**	References
1	1.1	Biotechnology definition and overview			
	1.2				
	1.3				

2	2.1	Microbial technology			
	2.2				
	2.3				
3	3.1	Primary and secondary metabolites			
	3.2				
	3.3				
4	4.1	Strain selection			
	4.2				
	4.3				
5	5.1	Strain improvement of industrial MO			
	5.2				
	5.3				
6	6.1	Methods of fermentation and bioreactors			
	6.2				
	6.3				
7	7.1	Downstream processing			
	7.2				
	7.3				
8	8.1	Probiotic development and medical uses			
	8.2				
	8.3				
9	9.1	Genetically modified food			
	9.2				
	9.3				
10	10.1	Microbial insecticides, microbial polymers			
	10.2				
	10.3				
11	11.1	Nanobiotechnology			
	11.2				
	11.3				
12	12.1	Protein production, hormones, gene engineering			
	12.2				
	12.3				

13	13.1	Biotech ethics, regulation, public concerns			
	13.2				
	13.3				
14	14.1	Environment biotechnology, biofuels, microbial fuel cells			
	14.2				
	14.3				

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

23 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)	Platform
2 hour examinations (first and second)	40 %			
Course project and student participation	20 %			
Final Examination	40 %			

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

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25 Course Policies:

<p>A- Attendance policies:</p> <p>B- Absences from exams and submitting assignments on time:</p> <p>C- Health and safety procedures:</p>
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D- Honesty policy regarding cheating, plagiarism, misbehavior:

E- Grading policy:

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

26 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

27 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: -----Signature: ----- Date: -----

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

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

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

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