هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Environmental Biotechnology
Course Code:	2054202-3
Program:	Bachelor in Biotechnology
Department:	Biotechnology Department
College:	College of Science
Institution:	Taif University
Version:	V4
Last Revision Date:	4/1445 – 9/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 (2 Lecture, 1 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered:					
(4th level/2nd year)					
4. Course general Description:					
The aim of this course is to introduce students to the applications of the use of living organisms to protect, repair, and preserve the environment. Topics will include the use of living organism in the treatment of sewage, transformation of agricultural and industrial biproducts, bioremediation and phytoremediation and clean technology, energy and biofuels production, biological control, organic agriculture, biosensors, and environmental monitoring. The course also will cover the applications of new technologies in the Saudi environment.					
5. Pre-requirements for this course (if any)**:**					
Microbial Biotechnology, 2054104-3					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
This course will introduce students to the applications of using living organisms to protect, save, and repair the environment using biotechnology and specifically in the Saudi environment.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the linkage of biotechnology to society.	K3	Lecture	Written Exam
1.2	State the principles and applications of Environmental Biotechnology.	K3	Lecture	Written Exam
1.3	Recognize different types of data and their graphical presentation	K5	Discussion	Report
2.0	Skills			
2.1	Compare between Phytoremediation and bioremediation,	S1	Project	Report
2.2	Analyze risk and benefits of biotechnology	S1	Discussion	Oral exam
2.3	Practice data collection, organization, and interpretation	S3	Problem solving	Written Exam
3.0	**Values, autonomy, and responsibility**			
3.1	---	---	--	--

C. Course Content

No	List of Topics	Contact Hours

1	Introduction to environmental biotechnology; concepts, applications, tools ….	2
2	The use of modified living organisms in the treatment of sewage	2
3	The use of living organisms in the transformation of agricultural and industrial biproducts	4
4	The use of living organisms in bioremediation and phytoremediation	4
5	The use of living organisms in energy and biofuels production	2
6	Biological control	4
7	Organic and sustainable agriculture	2
8	Biosensors and environmental monitoring	4
9	Environmental biotechnology and the Saudi environment.	4
10	Environmental regulations of the use of modified living organisms	2
Total		**30**

No	List of practical topics	Contact Hours
1.	Introduction to Microbial ecology and biosafety	3
2.	The importance of microbial diversity in environmental systems processes and biotechnology	6
3.	Areas of environmental biotechnology	3
4.	The interaction between micro-organisms and the environment	6
5.	Approaches for detection and identification of microorganisms in the environment	3
6.	Wastewater treatment, the role of microorganisms in biological waste treatment, Mineral resource, renewable energy and water recycling	6
7.	Bioremediation of organic and inorganic pollutants	3
8.	Microbes as indicators of risk factors in the environment and biotechnology.	6
9	Molecular approaches in environmental microbiology and biotechnology	3
10	The application of biosciences to the environment	6
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	Week 7	20%
2.	Periodical exam	Week 10	10%
3.	Report, Oral Exam	Week 11	10%
4.	Practical Exam	Week 15	20%
5.	Final Exam	Week 16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1.Seviour R, and P.H. Nielsen, Microbial Ecology of Activated Sludge, IWA Publishing, 2010 2.Jördening, H. J. and Winter, J. (2005). Environmental Biotechnology: Concepts and Applications, Wiley-VCH. (available at UTS Library E-book)
Supportive References	1.B. E. D. Rittmann, P. L. McCarty, Environmental Biotechnology: Principles and Applications, McGraw-Hill, 2001. 2.Vallero, D. A. (2010). Environmental Biotechnology: A Biosystems Approach, Elsevier. (available at UTS Library) 3.Evans, G. M. and Furlong, J. C. (2011). Environmental Biotechnology: Theory and Application, Wiley-Blackwell. (available at UTS Library)
Electronic Materials	Journal review articles, with links available on the Environmental biotechnology field website
Other Learning Materials	Biosafety system in the lab for practical exercises

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1. One classroom 2 hours per week for each section 2. Laboratory 3 hours per week for each practical section
Technology equipment (projector, smart board, software)	Data show, Smart board, and internet connection.**, Gel documentation instrument, PCR, Electrophoresis units, centrifuge, pipettes,**
Other equipment (depending on the nature of the specialty)	Thermolyze Shaker, Orbital shaking Incubator, Ph Meter, Hot air oven, Flask Shaker, Auto Clave, Portable Autoclave, Horizontal Laminar Flow Cabinet, Water Bath, Microscope Trinocular with Fluorescence attachment and attached Digital camera, Chlorophyll meter, Computerized Microwave digestion system, Comet Assay Tank, PCR machine, gel documentation system Micropipettes, Master mix, DNA Primers, glassware, DNA and RNA isolation kits. Cloning, RT-PCR (one step), PCR and ELISA kits and PCR beads.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Peer Review, Students**	**Direct (Independent Reviewer), Indirect (survey)**
Effectiveness of	**Faculty members**	**Direct (Random Correction)**

Assessment Areas/Issues	Assessor	Assessment Methods
Students assessment		
Quality of learning resources	Students	Indirect (survey)
The extent to which CLOs have been achieved	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	6
DATE	5/11/2023