UNIVERSITI TEKNOLOGI MARA

EVT576: ENVIRONMENTAL BIOTECHNOLOGY

Course Name (English)	ENVIRONMENTAL BIOTECHNOLOGY APPROVED
Course Code	EVT576
MQF Credit	3
Course Description	This course will interactively engage students cognitively and scientifically in areas of environmental biotechnology. This course is intended to provide an introduction to the biotechnological solutions towards the remediation of environmental problems. Students will also be introduced to the principles of genetic engineering and their role in environmental issues. The students are expected to be aware of the potential use of biotechnology in providing value added solutions to environmental issues. The topics such as, microbial transformation of organic waste, wastewater microbiology, bioremediation and clean technology will be discussed. In the end of the course, the students will be exposed to the current issues and development related to the environmental biotechnology. The outcomes shall be assessed through a variety of tools which include the traditional paper examination, tests, written assignment and oral presentation, laboratory reports and classroom engagement.
Transferable Skills	Analyzing biological samples for environmental monitoring
Teaching Methodologies	Lectures, Blended Learning, Web Based Learning, Simulation Activity, Problem Based Learning (PBL), Computer Aided Learning
CLO	CLO1 1. Explain the basic principles of biotechnology in solving environmental issues. CLO2 2. Analyse the feasibility of biotechnological applications on the environment CLO3 3. Demonstrate suitable biotechnological techniques which can be used to investigate the natural environment and provide potential solutions to remedy environmental damage. CLO4 4. Explain verbally selected current issues in environmental biotechnology development
Pre-Requisite Courses	No course recommendations

Topics
1. Introduction to Biotechnology 1.1) 1.1 Defining biotechnology. 1.2) 1.2 Brief history and development of biotechnology. 1.3) 1.3 Biotechnology in environmental protection.
2. Microbes and Metabolisms 2.1) 2.1 Metabolic pathways of particular relevance to environmental biotechnology. 2.2) 2.2 Biomass conversion and utilization of macromolecules. 2.3) 2.3 Enzyme and biofilm technology.
3. Biotechnological Treatment of Pollution. 3.1) 3.1 Analyzing biological sample. 3.2) 3.2 Biotechnology in monitoring pollution. 3.3) 3.3 Wastewater treatment biotechnology. 3.4) 3.4 Contaminated land and bioremediation. 3.5) 3.5 Phytotechnology and phytoremediation. 3.6) 3.6 Natural resources recovery and bioleaching.

4. Clean Technology and Pollution Control
4.1) 4.1 Industrial microbiology.
4.2) 4.2 Biological control.
4.3) 4.3 Microbial biopolymers.
4.4) 4.4 Biofuel.
4.5) 4.5 Utilization of agricultural wastes.
4.6) 4.6 Composting.

5. Current Issues in Environmental Biotechnology
5.1) 5.1 Genetic manipulation and environment
5.2) 5.2 Transgenic plants and agriculture biotechnology.
5.3) 5.3 Genetically modified organisms and the environment.
5.4) 5.4 Biotechnology and intellectual properties.

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	ASSIGNMENT 1	20%	CLO3
Assignment	ASSIGNMENT 2	20%	CLO3
Quiz	quiz on topics	10%	CLO4
Test	TEST 1	20%	CLO1
Test	TEST 2	20%	CLO2
Written Report	LAB REPORT	10%	CLO3

Reading List

Recommended Text

- **Lawrence K. Wang et al., Humana Press 2010, *Environmental Biotechnology,***

Reference Book Resources

- **Evans, G.M. 2003, *Environmental Biotechnology: Theory and Appli*, Ed., , John Wiley aSons, Ltd, UK. [ISBN:]**
- **Rittmann, B.E., McCarty, P.L., 2001, *Environmental Biotechnology: Principles and A*, Ed., , McGraw-Hill International Edition [ISBN:]**

Article/Paper List

Recommended Article/Paper Resources

- **C.G. Whiteley, D.J. Lee 2006, Enzyme Technology and Biological Remediation,, *Enzyme and Microbial Technology Journal*, 38**
- **Rittmann, B.E., McCarty, P.L 2002, Environmental Biotechnology: The Ongoing Quest, *Journal of Biotechnology*, 98**
- **Rex Montgomery 2004, Development of Biobased Products, *Bioresource Technology Journal.*, 91**

Other References

This Course does not have any other resources