University of Management & Technology

School of Science

Department of Life Sciences

Environment Biotechnology			
Lecture Schedule	Wednesday 12:30-13:45 PM Thursday 11:00-12:15 PM	**Semester**	Spring 2021
Pre-requisite	---	**Credit Hours**	3
Instructor	Dr. Kaneez Fatima	**Contact**	kaneez.fatima@umt.edu.pk
Office	IHM Hall	**Office Hours**	See office window
Course Description	This course examines current applications of biotechnology to environmental quality evaluation, monitoring, and remediation of contaminated environments. The scale of technology ranges from the molecular to macrobiotic. Topics included are fundamentals of biological interventions; genetic manipulation strategies in environmental biotechnology; pollution indicators and pollution control strategies and basic principles in bioremediation and biological water and waste treatment. These provide a foundation for subsequent discussions of microbial removal and degradation of organics, phytoremediation of soil and water contaminated with crude oil, heavy metals and industrial effluents.		
Expected Outcomes	On successful completion of the course students will be able to 1. Explain the importance of microbial diversity in environmental systems, processes and biotechnology 2. Describe existing and emerging technologies that are important in the area of environmental biotechnology 3. Describe biotechnological solutions to address environmental issues including pollution and water recycling		

Textbook(s)	1. Fluker MH, 2010. Environmental Biotechnology. CRC Press. 2. Ian L. Pepper, Charles P. Environmental Microbiology. 2015.
Grading Policy	• Quizzes & Assignment(s): 25% • Presentation 5% • Midterm: 30% • Final Exam: 45%

ENVIRONMENTAL BIOTECHNOLOGY

	Week	Lectures	Topics
	Week 1	1	Introduction to Environmental Biotechnology
		2	Products of Environmental Biotechnology
	Week 2	1	Pollution Indicators
		2	Pollution Control Strategies
	Week 3	1	Contaminated Land and Bioremediation
		2	Phytoremediation
	Week 4	1	Land filling
		2	Composting
	Week 5	1	Biodegradation and Biotransformation of Organic Pollutants
		2	Biotransformation of Inorganic Pollutants
	Week 6	1	Domestic Wastewater Treatment
		2	Industrial Wastewater Treatment
	Week 7	1	Wetlands-Constructed Wetland
		2	Floating Wetlands
	Week 8	1	Bioreactors in Wastewater Treatment-Anaerobic Digesters
		2	CSTR, Trickling Filters, Membrane Bioreactors
	Week 9	1	Mid-term
		2	Sludge Processing
	Week 10	1	Bio-Solids
		2	Bioreactors in Air Pollution
	Week 11	1	Vermi-composting
		2	Genetic manipulation strategies in environmental biotechnology
	Week 12	1	Bio fertilizers-Plant Growth Promoting Rhizobacteria
		2	Plant-Microbe Interaction and its role in Environment
	Week 13	1	Biofilm mediated Bioremediation
		2	Bio pesticides
	Week 14	1	Bio plastics
		2	Mycoremediation
	Week 15	1	Fundamentals of Biological Intervention
		2	Genetic Manipulations