



Jordan University of Science and Technology
Faculty of Agriculture
Natural Resources & Environment Department

NR722 Advanced Environmental Microbiology - JNQF Level: 9

Second Semester 2023-2024

Course Catalog

3 Credit Hours. Current concepts in soil and water quality. Description of modern pollution problems and potential biological remediation techniques. Focusing on chemistry, biochemistry, and molecular biology of bio-degradation in soils and waters contaminated with hazardous toxic compounds. The course explores the intricate role of microorganisms in environmental processes, focusing on bio-degradation, bio-remediation, and pollutant interactions. Topics include the characterization of bio-degradation microflora, methods for assessing bio-degradation, origins and types of environmental pollutants, and mechanisms of pollutant persistence and bio-magnification. Students will examine environmental factors that affect bio-degradation, delve into the biochemical pathways involved, and learn advanced techniques for analyzing microbial impacts on ecosystems. The course combines theoretical knowledge with practical applications in environmental microbiology, preparing students to address challenges in pollution control and ecosystem health.

Teaching Method: On Campus

Text Book

Title	Microbial Ecology, Fundamentals and Applications. Third Edition.
Author(s)	Atlas, R. M., and R. Bartha
Edition	3rd Edition
Short Name	Microbial Ecology
Other Information	Benjamin-Cummings (Pub.). Redwood City, CA. USA.

Course References

Short name	Book name	Author(s)	Edition	Other Information
Manual of Environmental Microbiology	Manual of Environmental Microbiology.	Hurst, C. J., G. R. Knudsen, M. J. McInerney, L. D. Stetzenbach, and M. V. Walter (eds.)	1st Edition	ASM Press. Washington DC. USA.
Bioremediation	Bioremediation, Science and Applications.	Skipper, H. D., and R. F. Turco (eds.).	1st Edition	SSSA Special Publication 43. Madison, WI. USA.
Methods of Soil Analysis	Methods of Soil Analysis. Part 2. Microbiological and Biochemical Properties.	Weaver, R. W. (ed.)	1st Edition	SSSA Inc. (Pub.). Madison, WI. USA.
Articles	A collection of scientific articles	Several	1st Edition	
Biodegradability of organic substances	Biodegradability of organic substances in the aquatic environment / authors,	Pavel Pitter, Jan Chudoba	1st Edition	

Instructor	
Name	Dr. Ragheb Tahhan
Office Location	C1L2
Office Hours	Sun : 08:30 - 09:30 Mon : 08:00 - 10:00 Tue : 08:30 - 09:30 Wed : 08:00 - 10:00
Email	tahhan@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Mon, Wed : 13:00 - 14:30 Room: C5021

Tentative List of Topics Covered		
Weeks	Topic	References
Weeks 1, 2	Introduction; Biodegradation and bioremediation-an overview	From Articles
Weeks 3, 4	Biodegradation microflora	From Bioremediation
Weeks 6, 7, 8	Assessing biodegradation	From Bioremediation , From Biodegradability of organic substances
Weeks 9, 10	Types and origins of environmental pollutants	From Manual of Environmental Microbiology , From Articles
Weeks 11, 12	Environmental factors affecting bio-degradation	From Bioremediation , From Articles , From Biodegradability of organic substances
Weeks 12, 13, 14	Persistence and bio-magnification	From Manual of Environmental Microbiology , From Biodegradability of organic substances
Weeks 15, 16	Selected topics and presentations	From Articles

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Understand the principles of biodegradation and bioremediation, including key microflora involved in the biodegradation process. [30MPLO1-K] [10L9K1, 10L9C1]	25%	
Evaluate environmental pollutants, their sources, persistence, and biomagnification within ecosystems. [20MPLO2-K] [10L9K2, 10L9C1]	25%	
Assess the impact of environmental factors on the biodegradation process and understand the biochemical pathways involved [30MPLO3-S] [15L9S1, 15L9S3]	25%	
Develop the ability to analyze data on biodegradation and pollutant interactions and present findings effectively [20MPLO4-S] [10L9S1, 5L9C4, 5L9C6]	25%	

Relationship to Program Student Outcomes (Out of 100%)														
PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	MPLO1-K	MPLO2-K	MPLO3-S	MPLO4-S	MPLO5-C	MPLO6-C
									25	25	25	25		

Relationship to NQF Outcomes (Out of 100%)						
L9K1	L9K2	L9S1	L9C1	L9C4	L9S3	L9C6
12.5	12.5	25	25	6.25	12.5	6.25

Date Printed: 2024-11-01