هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Environmental Pollution and Biodegradation
Course Code:	EVS 1358
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammed Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (Lecture 2, Lab 2)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: (Level 8 / 3rd Year)

4. Course general Description:

This course provides an overview of issues related to the degradation and pollution of terrestrial ecosystems, with a focus on soil and water. Students will learn about soil and plant sciences, microbiology, water management, and environmental conservation strategies. The course will also cover practical aspects of remediation, including the use of phyto-technologies. These methods involve using plants and microorganisms to remove contaminants and restore ecosystem health. They are cost-effective, non-invasive, and can complement traditional engineering-based approaches. The course will also discuss the advantages and limitations of these green technologies, including their ecosystem services, regulatory requirements, and public acceptance.

5. Pre-requirements for this course (if any)**:**

EVS 1110 EVS 1111 EVS 1228

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

In general, the course aims to:

1. Make student understanding and appreciation of the complex interactions of man, health, and the environment. It will expose students to the multi-disciplinary nature of

environmental health sciences; the information and tools required to assess environmental quality as it relates to human and ecosystem health.

Studying the positive and negative impacts of environmental degradation of pollutants on human, wildlife and other bioreceptors in aquatic and terrestrial ecosystems; and the control measures required to minimize, manage and/or eliminate specific environmental problems.

2. Address environmental stressors and pollution, their sources in the natural and workplace environments, their modes of transport and transformation, their ecological and public health effects, and existing methods for environmental disease prevention and remediation.

5. Demonstrate the benefits of natural and chemical catalysis.

4. Apply field and practical applications.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	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**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	-
Total		60

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	**Describe the impact of soil and water pollution on ecosystems and humans.**	K1	Three credits hours weekly lectures, lab and field	-Quizzes -Presentations -Assignments -written exams
1.2	**Outline the concepts of bioavailability and bioaccumulation.**	K2	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.3	**Explain the concepts of degradation, transformation, and recycling of organic and inorganic elements (i.e., pesticides, heavy metals)**	K3	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.4	**Discuss ecosystem services, regulatory requirements, and public acceptance of green technologies**	K3	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.5	**Identify the economic and social benefits/limitations of biological remediation methods. pollutants, sources, vision to reduce their negative effects, pollutants, sources, and vision to reduce their negative effects.**	K4	Design a histogram to illustrate the national pollutant concentration distribution and their hazards.	Design a histogram illustrate the national pollutant concentration distribution and their hazards.
2.0	Skills			
2.1	**Relate the multi-scale phenomena from plant cells to terrestrial ecosystems**	S1	Three credits hours weekly	-Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	.		lectures, lab and field Tutorials	
2.2	**Design a histogram to illustrate the national pollutant concentration distribution and their hazards.**	S2	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Assignments -written exams
2.3	**Distinguish the common sources and hazards of pollutants such as radiation, chemicals and heavy metals, emissions of gases, insecticides, industrial agricultural and human wastes.**	S3	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Reports
2.4	**Apply the methods to measure or detect pollutants, economic and health hazards, write the recommended methods to improve air and water sources, and prevent hazards to human health, livestock production and economic loss.**	S3	Design a histogram illustrate the national pollutant concentration distribution and their hazards. Skills	Design a histogram illustrate the national pollutant concentration distribution and their hazards.
2.5	**Analyze case studies and acquire an understanding of the complexity of what constitutes pollution remediation.** .	S4	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Show the ability to perform the assigned work independently and collaborate with interdisciplinary teams to achieve common goals.	V1	Group discussions	-Presentations -Reports
3.2	Share in scientific discussions professionally, and present research data effectively through different modes and for varied audiences.	V2	Group discussions	-Presentations -Reports
3.2	Demonstrate accountability and share positively in scientific discussions and decision-making processes.	V3	Group discussions	Presentations -Reports

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction, Syllabus.** **Introduction and basic concepts of Environmental pollution and Biodegradation.**	3
2.	**Water resources and pollution of different types of pollution (industrial - agricultural- thermal- sewage), and the use of microorganisms as evidence of pollution.**	3
3.	**Poisoning water bodies due to flourishing of toxic algae species and its impact on human and animal. Underground water pollution.**	3
4.	**Water pollution: with oil residues and heavy metals and the bioaccumulation and biodegradation phenomenon**	4
5.	**Water pollution: petroleum pollution of marine and freshwater environments**	3
6.	**Atmosphere (air pollution, acid rain and damages, the erosion of the ozone layer, global warming).**	3
7.	**Soil pollution: chemicals, oil, insecticides sources, effects, biodegradations and solutions.**	4
8.	**Environmental effects on microbial and chemical degradation**	3
9.	**Types of catalysts**	2
10.	**Communication and Reporting** **Writing Research Reports** **Presenting Findings and Data** **Peer Review and field trips**	2
Total		**30**

No	List of Laboratory Topics	Contact Hours
1	**Introduction, Syllabus.** **Introduction and basic principles of Environmental pollution control and Biodegradation.**	**3**
2	**Case study of Water pollution and biodegradation**	**2**
3.	**Case study of soil pollution and biodegradation**	**3**
4.	**Case study of air pollution and pollutant fate**	**2**
5.	**Case study of petroleum pollution of marine environments and biodegradation**	**3**
6.	**Case study of pesticide pollution.**	**3**
7.	**Functions of the pollution control board**	**3**
8.	**catalysts experiments**	**3**
9.	**Observations, Communication, Reporting and Writing field Reports of some small ecosystems. presenting Findings Data of the field trips**	**8**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	Around 4th - 5th week	15%
2.	Midterm exam 2	Around 7th - 8th week	15%
3.	Quizzes, Participation, Attendance, Presentations	During the semester	10%
4.	Lab reports	During the semester	5%
5.	Lab Exam	15th week	15%
6.	Final Exam	16th week	40%
Total			**100%**

* 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- UN News Global perspective Human stories (2021) IPCC report: 'Code red' for human driven global heating, warns UN hief. https://news.un.org/en/story/2021/08/1097362 (Accessed 9/08/2021). 2- Masindi V, Muedi KL (2018) Environmental contamination by heavy metals. Heavy metals, eds R. Chamy, F. Rosenkranz (Rijeka: InTech Open) 10(1):115–132 3- Stadler Bernhard M and de Vries Johannes G (2021) Chemical upcycling of polymers. Phil. Trans. R. Soc. A. 379:20200341. 4-Xia Q, Chen C, Yao Y, Li J, He S, Zhou Y, Li T, Pan X, Yao Y, Hu L (2021) A strong, biodegradable and recyclable lignocellulosic bioplastic. Nat Sustain 4(7):627–635. 5- Zhong Y, Godwin P, Jin Y, Xiao H (2020) Biodegradable polymers and green-based antimicrobial packaging materials: A mini-review. Adv Ind Eng Polym Res 3(1):27–35. 7-anczak K, Dąbrowska GB, Raszkowska-Kaczor A, Kaczor D, Hrynkiewicz K, Richert A l (2020) Biodegradation of the plastics PLA and PET in cultivated soil with the participation of microorganisms and plants. Int Biodeterior Biodegrad 155: 105087
Supportive References	
Electronic Materials	2-University of Florida Course Specification of SWS 6366 Biodegradation and Bioremediation of Organic Contaminants .
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories

Items	Resources
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the specialty)	Environment-related instruments

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students assessment	Program leader	Direct
Quality of learning resources	Peer Reviewer	Indirect
The extent to which CLOs have been achieved	Program leader	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/2/1446H**