هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title:	Environmental Biomonitoring and Remediation
Course Code:	EVS 1360
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 (Lectures 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 6 / 3rd Year)					
4. Course General Description:					
This course covers environmental monitoring principles (physical, chemical, and biological), as well as bioindicators and their usefulness in environmental biological monitoring for water, soil, and air quantitatively, genetically and biochemically. One of the steps following the bioevaluation of the environmental quality is Bioremediation which is the process of using living organisms to remove or neutralize environmental contaminants like pesticides, PCBs, and drugs. A focus on Genetically Modified Organisms (GMO) impacting the environment is also evoked to assess the impact on unintended organisms; GMO crops; and using plants to clean up mercury and other pollutants that are organic in nature.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1111					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
Environmental Monitoring and Bioremediation' is an advanced general survey course that familiarizes students with the main concepts. At the end of the course, they must understand the concepts of Environmental biomonitoring and apply such an approach to determine the environmental quality. Students can thereafter choose bioindicative taxa in surveys and ecotoxicological studies. The students will be also able (1) to acquire the expertise to lower the levels of contaminants, such as heavy metals and pesticides, through plant growth and the use of micro-organisms, (2) to incorporate the foundational concepts of microbiology necessary to comprehend the breakdown of harmful and poisonous organic substances, and (3) to be familiar with the latest bioremediation methods for addressing pollution issues.					

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)**	0
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	Identify the different types of pollutants: classic and emerging And define the bioremediation and phytoremediation	**K1**	Lecture and take-home research assignment	Quizzes, midterm exams and final exam
1.2	Explain the toxicity of contaminants	**K2**	Lecture and take-home research assignment	Quizzes, midterm exams, and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Discuss the outcomes of surveys using bioindicators and biomarkers	**K3**	Lecture and take-home research assignment	Quizzes, midterm exams, and final exam
2.0	**Skills**			
2.1	Differentiate between the Ex-situ bioremediation and In-situ bioremediation	**S1**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.2	Evaluate the roles of organisms in bioremediation	**S2**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.3	Analyze the collected information about bioremediation strategies	**S3**	Laboratory and take-home research assignment	Lab reports and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate independence and cooperate effectively in a team	**V1**	Lecture, laboratory, and take-home research assignment	Quizzes, midterm exams, Lab reports, project presentations, Lab exams and final exam
3.2	Show the ability to communicate information about Environmental Biomonitoring and Bioremediation to various audiences in an accurate, compelling, and logically supported manner, via writing and talks.	**V2**	Lecture, laboratory, and take-home research assignment	Quizzes, midterm exams, Lab reports, project presentations, Lab exams and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3	Share in the discussion of literature articles in the field of Environmental Biomonitoring and Bioremediation, extract essential information, interpret figures, and summarize key points, to improve critical thinking and evaluation skills.	**V3**	Lecture, laboratory, and take-home research assignment	Quizzes, midterm exams, Lab reports, project presentations, Lab exams and final exam

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Toxicity of classic and emerging contaminants	**4**
2.	Major environmental contaminants (physical and chemical) Factors affecting bioremediation	**4**
3.	Environmental risk assessment	**4**
4.	Ecotoxicological methods	**2**
5.	Environmental pollution and restoration: 1. Role of bioremediation 2. Forms of pollution 3. Evolution of bioremediation	**2**
6.	Field bioremediation 1. *Ex-situ* bioremediation 2. *In-situ* bioremediation	**2**
7.	Bioaugmentation - Biostimulation	**2**
8.	1. Direct and indirect phytoremediation 2. Strategies of phytoremediation	**2**
9.	Phytoremediation 1. Advantages and disadvantages Methods used in phytoremediation 2. Role of rhizosphere	**2**

10.	Genetically modified organisms used in bioremediation	2
11.	1. Bioremediation of petroleum contaminants 2. Pesticides and paintings 3. Plastics - Dyes	2
12.	Bioremediation of metals and radionuclides	2
Total		30

No	List of Topics (labs)	Contact Hours
1.	Strategies and Techniques of Sampling	8
2.	Methods in air, soil, and water biomonitoring	8
3.	Ecotoxicological methods	4
4.	Data analysis in Biomonitoring and Experimental studies	4
5.	Treatment of industrial wastes	4
6.	Bioconversion of organic wastes and composting	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	Around 4th - 5th week	15%
2.	Midterm 2	Around 7th - 8th week	15%
3.	Quizzes, Participation, and Attendance	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	Singh A., Kuhad R.C. and Ward O.P. (2009). Advances in Applied Bioremediation. Springer-Verlag Berlin Heidelberg, Germany. Singh A., and Ward O.P.(2004). Applied Bioremediation and Phytoremediation. Springer Verlag Berlin .Heidelberg, Germany. Atlas R.A. and Philp J. (2005).Applied Microbial Solutions for Real-World Environmental Cleanup. ASM, Washington, D.C., USA
Supportive References	None
Electronic Materials	Campbell, J. B. (1996) Introduction to Remote Sensing (2nd Ed), London: Taylor and Francis. R. Harris, 1987. "Satellite Remote Sensing, An Introduction", Routledge & Kegan Paul. Jensen, J. R. (2000) Remote Sensing of the Environment: An Earth Resource Perspective, 2000, Prentice Hall, New Jersey. Jensen, J. R. (2005, 3rd ed.) Introductory Digital Image Processing, Prentice Hall, New Jersey. Mather, P. M. (1999) Computer Processing of Remotely-sensed Images, 2nd Edition. John Wiley and Sons, Chichester. W.G. Rees, 1996. "Physical Principles of Remote Sensing", Cambridge Univ.
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and Laboratories
Technology equipment (projector, smart board, software)	Projector and Smartboard
Other equipment (depending on the nature of the specialty)	None

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 Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Head of Biology Department**
REFERENCE NO.	
DATE	