هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Fundamentals of Environmental Science
Course Code:	EVS 1110
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: 4 (Lecture 3 + Lab 2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 1 / First Year)					

4. Course general Description:

The fundamental Environmental Science course is designed to offer an integrated approach to the basic scientific study and basic analysis of the environment, backed-up with a good awareness of current environmental issues and concerns. The course aims to provide a stimulating learning environment to enable students to develop a range of academic and generic skills to help them find good quality employment on graduation and provide the basis for a lifetime of learning. The course embraces the integrated nature of environmental science, drawing on biology, chemistry, physics, and geology to allow students to interpret the pressures on our environment and point to ways in which we can act to manage these more successfully. Elements of the course can be chosen including energy resources and the science of zero carbon, hydrology, climate change and environmental conservation. There is the opportunity to specialize and numerous opportunities for fieldwork. In the final-year dissertation, students are able to choose their own area in which to conduct a substantial environmental investigation to produce a report.

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

None

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

None

7. Course Main Objective(s):

The course aims to help and equip students to work as environmental scientists or within alternative employment. In general, the course aims to:

1- Develop knowledge of the variety of strategies needed to work in the field of environmental science.

2- Train the students with a specialist knowledge of a specific aspect of environmental science, such as ecology or environmental chemistry.

3- Provide a stimulating, wide-ranging, integrated program in the environmental sciences.

4- Develop a range of key skills through opportunities provided in the study modules, including critical, analytical, practical, research and communication skills, to prepare students for the next environmental courses study and/or professional qualifications.

5- Provide a challenging, stimulating and self-rewarding study environment.

6- Professionally train students such that it will enhance their skills and help them towards a satisfying career in environmental science.

7- Develop the skills necessary for life-long independent learning and acquisition of knowledge.

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**	45
2.	**Laboratory/Studio**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		75

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	**Clarify the contributions of the natural sciences and the social sciences to the identification, understanding and resolution of environmental issues.**	K1	Three credits hours weekly lectures, lab and field	-Quizzes -Presentations -Assignments -written exams
1.2	**Describe the processes which shape the natural world at different spatial and temporal scales and how they influence, and are influenced by, human activities.**	K2	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.3	**Explain how knowledge of environmental issues forms the basis for informed concern about the Earth and its people.**	K3	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.4	**Outline the issues concerning the availability and sustainability of the Earth's resources, including the consequences for the environment of resource exploitation and waste disposal and the human responses to environmental problems such as environmental impact assessments, management and policy**	K3	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.5	**Illustrate the interaction of human and Earth systems and the roles of organizations and other stakeholders in managing and regulating human impacts on the environment**	K4	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
2.0	**Skills**			
2.1	**Evaluate the methods of acquiring, interpreting and analysing information relating to the environment, with a critical understanding of the appropriate contexts for their use, and apply these methods to enable monitoring and management of natural and human-induced environmental changes.**	S1	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
2.2	**Analyze and interpret information and communicate any findings, both orally and in writing, in a coherent manner**	S2	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Assignments -written exams
2.3	**Plan a research study, and perform the work using the proper research tools**	S3	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Reports
2.4	**Employ the appropriate independent research skills for the investigation of issues in environmental science, including experimental design, fieldwork, survey and monitoring, laboratory work, statistical testing and spatial representation of data**	S4	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Reports
3.0	**Values, autonomy, and responsibility**			
3.1	**Show the ability to perform the assigned work independently and collaborate with**	V1	Group discussions	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	interdisciplinary teams to achieve common goals.			
3.2	**Share in discussion of scientific issues professionally, and present research data effectively through different modes and for varied audiences.**	V2	Group discussions	-Presentations -Reports
3.3	**Show accountability and share positively in scientific discussions and decision-making processes.**	V3	Group discussions	Presentations -Reports
3.4	**Adhere to the moral and ethical issues relating to environmental sciences, including scientific examination of the implications of sustainability relating to natural resources and sustainable development.**	V4	Three credits hours weekly lectures, lab and field Tutorials	-Presentations -Assignments -written exams

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction, Syllabus.** **Introduction and basic concepts of environmental science.**	6
2.	**Introduction to Principles of Ecology**	6
3.	**Biodiversity Conservation**	6
4.	**Introduction to Global Environmental Issues**	3
5.	**Technical Skills for Environmental Scientists**	3
6.	**Experimental Design and Analysis**	3
7.	**Living with Climate Change**	3
8.	**Sustainability**	3
9.	**Environmental Monitoring & GIS**	3
10.	**Innovations in Energy**	3
11	**Communication and Reporting** **Writing Research Reports** **Presenting Findings and Data** **Peer Review and field trips**	6
Total		45

No	List of laboratory and practical Topics	Contact Hours
1.	Introduction, Syllabus and Equipment for measuring physical factors	4
2.	Sampling methods (may be in field trip)	4
3.	Biodiversity	4
4.	Discussion & presentation of a scientific report on the pitfall trap method	2
5.	Isobar, isotherm and global warming	2
6.	Acidity	2
7.	Salinity	2
8.	Alkalinity	2
9.	Hardness	2
10.	Soil analysis	2
11	Population Growth (may be in field trip)	2
12	Environmental orientation to design a city	2
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	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	C.H. Walker, R.M. Sibly, S.P. Hopkin, D.B. Peakall (2006) PRINCIPLES OF ECOTOXICOLOGY, Fourth Edition.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	Environmental-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	Faculty	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	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/2/1446H**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024

TP-153

Course Specification

(Bachelor)

Course Title:	Basics of Biology
Course Code:	EVS 1112
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: 4 (Lecture 3+ Lab 2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (Level 1 / First year)					
4. Course General Description:					
Basic biology is a core discipline that seeks to provide students with a fundamental understanding of biological principles and concepts. This course covers a wide range of topics, including cellular structure and function, genetics, evolution, the diversity of life (including animal and plant taxonomy), evolutionary connections between species, and the physiological systems of organisms and their interaction with the environment. By engaging in lectures, laboratory exercises, and interactive activities, students will acquire a fundamental understanding of biology and its practical implications in both daily life and scientific research.					
5. Pre-requirements for this course (if any)**:**					
None.					
6. Co-requisites for this course (if any)**:**					
None.					
7. Course Main Objective(s):					
The course aims to : -Explain the basic structure and function of cells, including cell organelles and cellular processes. -Describe the principles of genetics, including inheritance, DNA structure, and gene expression. -Discuss the theory of evolution and the mechanisms that drive evolutionary change. Identify and classify the diversity of life forms, from microorganisms to multicellular organisms. -Illustrate the ecological principles and the interactions between organisms and their environments. -Develop the critical thinking and scientific inquiry skills of the students through laboratory experiments.					

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**	45
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		75

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 basic structure and function of cells, including cell organelles and cellular processes.**	K1	Three credits weekly lectures	-Written exams -Quizzes -Class participation -Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	**Discuss the fundamentals of evolution theory and evolutionary mechanisms as well as reproduction at the Cellular Level.**	K2	Three credits weekly lectures	-Written exams -Quizzes -Class participation -Assignments
1.3	**Outline the principles of genetics, including inheritance, DNA structure**	K3	Three credits weekly lectures	-Written exams - Quizzes -Class participation -Assignments
1.4	**Clarify the classification and the diversity of life forms, from microorganisms to multicellular organisms.**	K4	Three credits weekly lectures	-Written exams -Quizzes -Class participation -Assignments
2.0	**Skills**			
2.1	**Relate the concepts and theories of biology to explain the various biological phenomena**	V1	-Weekly lab sessions. -Lab tutorials	-Lab group discussions -Presentations -Lab report
2.2	**Employ the practical skills and lab tools to conduct experimental work**	V2	-Weekly lab sessions. -Lab tutorials	-Lab group discussions -Presentations -Lab report
2.3	**Evaluate, interpret, and**	V3	-Weekly lab sessions.	-Lab group discussions

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	analyze the research results using the appropriate analytical methods		-Lab tutorials	-Presentations -Lab report
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate the ability to work independently and cooperate in a team**	V1	-Lectures and cooperative education -Group discussions	-Reports -Data Search -Presentations
3.2	**Show the ability to assemble information from a variety of sources (textbooks, research papers and review articles), and use information technology to prepare, process and present information**	V2	-Lectures and cooperative education -Group discussions	-Reports Presentations
3.3	**Adhere to ethical regulations while working in the field of biology**	V4	-Lectures and cooperative education -Group discussions	-Reports

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	**Introduction to Biology** • The Biosphere From Organisms to Ecosystems • Characteristics of living organisms • Levels of biological organization Chemistry of Life : • The Building Blocks of Molecules, Water, pH and Buffers • Synthesis and Breakdown of Macromolecules • Biogeochemical Cycles:(Water – Carbon- Nitrogen Cycle)	6
2.	**Cell Biology:** • Cell theory • Structure and function of prokaryotic and eukaryotic cells • Cellular organelles and their functions • Cell membrane structure, function and transporting mechanisms • Cellular respiration (Energy in Living Systems)and photosynthesis	6
3.	**Introduction to Reproduction at the Cellular Level** • The Genome • The Cell Cycle and Mitosis • Prokaryotic Cell Division • Sexual Reproduction • Meiosis	6
4.	**Genetics** • Mendelian genetics (Gregor Mendel and Genetic Crosses) • Extensions of the Laws of Inheritance • Chromosomal Basis of Inheritance • DNA structure and replication • Gene expression and regulation	6
5.	**Evolution and Taxonomy** • Taxonomy : An overview of the major kingdoms and domains of life • Characteristics of viruses, bacteria, protists and fungi • The history of evolutionary thought • Natural selection and adaptation	3

	• Speciation and evolutionary relationships	
6.	**Plant Taxonomy** • The plant kingdom • Seedless plants • Seed plants: gymnosperms • Seed plants: angiosperms	**3**
7.	**Animal Taxonomy** • Features of the Animal Kingdom • Sponges and Cnidarians • Flatworms, Nematodes, and Arthropods • Mollusks and Annelids • Echinoderms and Chordates • Vertebrates.	**3**
8.	**Comparative anatomy and animal physiology** • The Body's Systems • Homeostasis and Osmoregulation • Digestive System, Circulatory and Respiratory Systems • Endocrine System • Musculoskeletal System • Nervous System • The Immune System and Disease: Innate Immunity and Adaptive Immunity Animal Reproduction and Development: • How Animals Reproduce • Development and Organogenesis • Human Reproduction	**9**
9.	**Ecology** • Ecosystems and biomes • Population dynamics • Community interactions: predation, competition, and symbiosis • Energy flow and nutrient cycles • Human impact on the environment	**3**
Total		**45**

No	List of Topics (Labs)	Contact Hours
1.	Laboratory Biosafety – Identification of lab's instruments and tools	2
2.	Components and types of microscopes Training the use of Light microscope Electron microscopes ((SEM, TEM): theoretical and training the use (if possible) Training the use different types of manual pipettes and automated pipettes	4
3.	Specimen Collection and Fixation • Types of specimens (plant, animal, microbial) • Fixatives and their chemical properties • Fixation techniques	4
4.	Embedding and Sectioning : Paraffin embedding - Cryoembedding Microtomy techniques :(rotary and sliding microtomes) : Training the use (if possible) Sectioning strategies Staining techniques: basic stains (hematoxylin and eosin) Microscopy and Imaging Light microscopy (bright field, phase contrast, dark field) Electron microscopy (SEM, TEM)	4
5.	Molecular Models, Structure of Animals and Plants Cells. Animal and Plant Tissue Slides.	2
6.	Kingdom Fungi Slides. Kingdom Protista Slides. Kingdom Monera Slides..	4
7.	Genetic crosses and analysis Cell Cycle and Mitosis& Meiosis.	2
8.	Identification of different systems in human Classifications of some animals in animal's museum in the college	2
9.	Enzyme activity assays Osmosis and Diffusion.	2
10.	Molecular biology techniques such as DNA extraction and gel electrophoresis	2
11.	Ecological field studies Revision	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Midterm exam 1**	Around 5th week	15 %
2.	**Midterm exam 2**	Around 8th week	15%
3.	**Quizzes, Participation, Attendance, Presentations, Essays**	During the course	10 %
4.	**Lab reports**	11 th week	5%
5.	**Final Lab. Exam**	15th week	15 %
6.	**Final Exam**	16 th week	40 %
7.	**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	-Campbell, N.A. and Reece, J. B. (2008) Biology 8th edition, Pearson Hickman C. P. Jr. et al., Integrated Principles of Zoology. 16th ed. (2013). ISBN-13: 9780073524214. - Paul Waldau. Animal Studies: An Introduction 1st Edition (2013). ISBN-13: 9780199827039. Barnes,R.D. Invertebrate Zoology (1982) VI Edition. Holt Saunders International Edition. -Bruce Alberts et al., Essential Cell Biology, Third edition, London, UK. (2009). ISBN-13: 978-0815341291. Lodish, et al. Molecular Cell Biology. 5th ed. New York, NY: W.H
Supportive References	https://2u.pw/CHVAeNVg
Electronic Materials	Access to scientific databases, educational videos, and interactive simulations
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms , Laboratories and exhibition rooms
Technology equipment (projector, smart board, software)	Projector and Smartboard
Other equipment (depending on the nature of the speciality)	Tutorial Videos

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**

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2024
TP-153

Course Specification
(Bachelor)

Course Title:	Terrestrial and Aquatic Ecology
Course Code:	EVS 1114
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 1/ First Year)					
4. Course general Description:					
This course provides a conceptual framework for understanding the range of the world's terrestrial and Aquatic ecosystems and provides practical field experience with major terrestrial and Aquatic ecosystems in the Kingdom of Saudi Arabia. Topics include: the structure and function of Terrestrial and Aquatic Ecology ecosystems, Appreciate the intrinsic and extrinsic values of ecosystems and biodiversity, the basics of nutrient cycling; food webs; biodiversity, concerns and consequences of associated human influence, energy usage and production including renewable resources, Comprehend the dimensions of the sustainability challenge.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1112					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The course intends to: - Provide students' knowledge of terrestrial and Aquatic ecosystems. -Explain the major processes and mechanisms that control the flow and storage of energy and the cycling of material in a terrestrial and Aquatic ecosystem. -Describe how human activity impacts ecosystems. -Comprehend the dimensions of the sustainability challenge.					

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**	-
4.	**Tutorial**	-
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	**Identify the main principles and processes involved in terrestrial and Aquatic ecosystems.**	K1-K2	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work
1.2	**Explain the values and purposes of terrestrial and Aquatic ecosystems as part of global conservation strategies.**	K3-K4	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work
2.0	Skills			
2.1	**Analyze the cultural, social, economic, and community implications in the protection and management of terrestrial and Aquatic ecosystems.**	S1-S2	-Lectures -Classroom discussions -Cooperative education	-Classroom participation -Presentations - Written exams
2.2	**Apply ecosystem management concepts and approaches to protection and management of terrestrial and Aquatic ecosystems.**	S3-S4	-Lectures -Classroom discussions -Cooperative education	Classroom participation -Presentations -Assignments -written exams
3.0	Values, autonomy, and responsibility			
3.1	**Participate in work and communicate effectively in groups.**	V1-V2	--Lectures -Classroom discussions -Research	-Classroom participation -Presentations

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	**Adhere to assigned tasks with responsibility.**	V3-V4	-Lectures -Classroom discussions	-Classroom participation -Presentations

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Introduction, Syllabus. General principles of ecology (population ecology, community and ecosystem ecology), and basic knowledge of Terrestrial and Aquatic Ecology.	4
2.	The structure and function of Terrestrial ecosystems, Appreciate the intrinsic and extrinsic values of Terrestrial ecosystems and biodiversity.	4
3.	The structure and function of Aquatic ecosystems, Appreciate the intrinsic and extrinsic values of Aquatic ecosystems and biodiversity.	4
4.	Community Ecology of Terrestrial Ecology: Species Interactions, food chain and food webs.	4
5.	Community Ecology of Aquatic Ecology: Species Interactions, food chain and food webs.	4
6.	Basics of the nutrient cycling.	2
7.	Energy usage and production including renewable resources.	2
8.	Impact of human activities on the Terrestrial and Aquatic Ecology.	2
9.	The roles of people in conservation.	2
10.	Maintaining sustainable use of natural resources.	2
Total		**30**

No	List of Topics (labs)	Contact Hours
1.	Introduction: Terrestrial and Aquatic Ecology.	4
2.	Techniques and methods for quantifying environmental characteristics of terrestrial and aquatic ecosystems.	4
3.	Community structure by species richness, evenness and diversity of community (Plant and animal) using different indices.	2
4.	Collective analysis and discussion (Scientific papers and documentary videos on Terrestrial ecosystems).	4
5.	Collective analysis and discussion (Scientific papers and documentary videos on Aquatic ecosystems).	4
6.	Designing experiments and collecting and analyzing data for a range of animals and plants.	4
7.	Field observation, data analysis and presentation of findings in presentations and reports.	4
8.	Field observation, data analysis and presentation of findings in presentations and reports.	4
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	-Terrestrial Ecosystem Ecology: Principles and Applications, 2012, by Folke O. Andersson and Göran I. Ågren، -Fundamentals of Aquatic Ecology. 2009. K. H. Mann ،R. S. K. Barnes -Conservation Biology for all. 2010. edited by Sodhi, N. S, and P. R. Ehrlich. Oxford University Press. -Field and Laboratory Activities for Environmental Science. 2012. Eldon Enger ،Bradley F. Smith
Supportive References	
Electronic Materials	• Saudi Digital Library
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the specialty)	Environmental-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 Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

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

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Education & Training Evaluation Commission

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NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Applied Calculus for Environmental Science
Course Code:	MAT 1109
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	2024 – V1
Last Revision Date:	None

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 4 (Lecture 3+Lab 0+Tutorial 2)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 2/ First Year)					
4. Course general Description:					
This course describes the most important ideas, results, and examples of basic precalculus, limit, differentiation, and integration. The course includes the essential fundamentals of these topics. The emphasis is on calculations and applications to environmental problems.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
Understanding basics of precalculus, differentiation and Integration and their applications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	**0**	**0%**
4	Distance learning	**0**	**0%**

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	30
5.	Others (specify)	0
Total		75

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	Recall basics of Precalculus.	K1	Lectures, problem-solving, Classroom discussions	Direct: Regular Exams, Lab Assignments, Practical exam
1.2	List basic tools of limits, differentiation, and Integration.	K1, K2	Lectures, problem-solving, Classroom discussions	Direct: Regular Exams, Lab Assignments, Practical exam
2.0	Skills			
2.1	Apply techniques of problem solving.	S1	Lectures, problem-solving, Classroom discussions	Direct: Regular Exams, Lab Assignments, Practical exam
2.2	Report mathematics clearly and precisely both orally and in writing.	S2, S3	Lecturing, Interactive learning.	Direct: Assignments, Practical exam
2.3	Demonstrate the connection between differentiation and its applications in areas and volumes.	S3, S4	Lecturing, Interactive learning.	Direct: Assignments, Practical exam
2.4	Draw graphs of functions handily and by using CAS and online solvers.	S1	Lectures, problem-solving, Classroom discussions.	Direct: Regular Exams, Lab Assignments, Practical exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	**Work individually.**	**V1**	**Lectures, problem-solving, Classroom discussions**	**Direct: Regular Exams, Lab Assignments, Practical exam**
3.2	**Develop personal values and attributes such as honesty, empathy and respect for others.**	**V2**	**Lectures, problem-solving, Classroom discussions**	**Direct: Regular Exams, Lab Assignments, Practical exam**

C. Course Content

No	List of Topics	Contact Hours
1	**Preliminaries:** The Real Numbers and The Cartesians Plane, Solving Linear Equations and Inequalities, Equations of Lines, Quadratic Equations and Inequalities, Special Product Formulas, Polynomials, Factoring Polynomials; Systems of Linear Equations in two variables. Sequences: Arithmetic and Geometric Sequences.	**20**
2	**Functions:** Domain, Range, and Graphs of Functions, Common Functions, Composition of Functions, Inverse Function; Trigonometric Functions (Sine, Cosine, and Tangent Function), Exponential and Logarithmic Functions, Laws of Exponents and Logarithms.	**10**
3	**Limits:** The Concept of Limit, Computation of Limits, Limits Involving Infinity.	**10**
4	**Differentiation:** The Derivative, Computation Of Derivatives, The Power Rule, Product and Quotient Rules, Chain Rule, Tangent Lines, Derivatives Of Trigonometric Functions, Derivatives of Exponential and Logarithmic Functions.	**15**
5	**Applications of Differentiation**: Indeterminate Forms and L'Hopital's Rule, Maxima and Minima Values, Increasing and Decreasing Functions, The First Derivative Test, Graphing Functions.	**10**
6	**Integration:** Anti-derivatives, The Definite Integral and The Fundamental Theorems of Calculus.	**10**
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homeworks, Mini projects	During the semester	10%
2.	First Midterm Exam	Week 5	25%
3.	Second Midterm Exam	Week 10	25%
4.	Final Exam	Week 15	40%

*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	***Calculus, Early Transcendental Functions,*** Robert Smith, Roland Minton, McGraw-Hill Science Engineering, 2007. **(Main Reference)**
Supportive References	▪ ***Calculus***; O. Swokowski, et al, PWS Pub. Co.; 6th Edition, 1994. ▪ ***Calculus: Early Transcendentals***, 7th Edition; C. Henry Edwards, David E. Penney, Pearson Prentice Hall, 2008.
Electronic Materials	None
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Each classroom should be equipped with a whiteboard and a projector.** **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (projector, smart board, software)	**The rooms should be equipped with data show and Smart Board**
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**	**Each student will complete two evaluation forms during the semester and at the end of the course.**
Effectiveness of Students' assessment	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Quality of learning resources	**Students**	**Each student will complete two evaluation forms during the semester and at the end of the course.**
The extent to which CLOs have been achieved	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Other	**None**	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**4/1446**
DATE	**06/03/1446 (09/09/2024)**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Statistical Analysis of Environmental Data (1)
Course Code:	STA 1112
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	2024 – V1
Last Revision Date:	None

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (Lecture 2+ Lab 2+ Tutorial 0)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Level 2 / First Year					

4. Course general Description:

The course covers both descriptive statistics and hypothesis testing in the field of environmental science. The students acquire the skills to compute and analyze measurements of location and deviations, frequencies, and covariation. The course covers the use of sample data to estimate a population parameter. The course will focus on the application of univariate and multivariate statistical approaches, explaining statistical ideas without requiring intricate mathematical proofs.

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

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

7. Course Main Objective(s):

- Describe discrete data graphically and compute measures of centrality and dispersion.
- Design and implement effective data collection methods for environmental studies, including sampling techniques and experimental design.
- Introduce students to statistical modeling techniques that can be used to predict and understand complex environmental systems and phenomena.
- Apply statistical methods to real-world environmental problems, such as pollution assessment, biodiversity studies, and climate change impact analysis.
- Develop students' ability to effectively communicate statistical findings to both technical and non-technical audiences, emphasizing the importance of data visualization and clear reporting.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	**0**	**0%**
4	Distance learning	**0**	**0%**

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	**To state the various measures of central tendency and dispersion.**	**K1**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**
1.2	**To outline effective sampling strategies and data collection methods for environmental studies.**	**K1, K2**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**
1.3	**To define and reproduce the population and sample, sample size, parameter, and estimate.**	**K1**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.4	To memorize the use of computer programming to apply these concepts to environmental problems.	K1, K2	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
2.0	**Skills**			
2.1	To summarize data using tables and charts.	S1	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
2.2	To explain various statistical methods used in environmental statistics.	S2, S3	Lecturing, Interactive learning.	Assignments, Practical exam
2.3	To perform descriptive and inferential statistical analyses.	S3, S4	Lecturing, Interactive learning.	Assignments, Practical exam
2.4	To interpret the output obtained from a statistical software package.	S1	Lectures, problem-solving, Classroom discussions.	Regular Exams, Lab Assignments, Practical exam
3.0	**Values, autonomy, and responsibility**			
3.1	To show collaborative approaches in data analysis projects, valuing diverse perspectives and fostering an inclusive learning environment.	V1	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
3.2	To draw decisions based on data analysis and understand the broader environmental and social implications of their findings.	V2	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
3.3	Demonstrate a commitment to ethical standards in data collection, analysis, and reporting, ensuring transparency and integrity in	V4	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	environmental research.			

C. Course Content

No	List of Topics	Contact Hours
1	**Introduction:** The Meaning of Statistics, The Uses of Statistics, Descriptive and Inferential Statistics, Sources of Data: Surveys and Experiments, Retrospective and Prospective Studies, Demographic Data, Population and Sample, Qualitative and Quantitative Data, Scales of Measurement.	**10**
2	**Exploring Data with Tables and Graphs:** Frequency Distributions for Organizing and Summarizing Data; Histograms; Graphs That Enlighten and Graphs That Deceive; Scatterplots, Correlation, and Regression. ***Applications using statistical software.***	**12**
3	**Describing, Exploring, and Comparing Data:** Measures of Center; Measures of Variation; Measures of Relative Standing and Boxplots. ***Applications using statistical software.***	**12**
4	**Probability and Probability Distributions:** Basic Probability Concepts, Normal Probability Distribution, Discrete Probability, Distributions: Binomial and Poisson. ***Applications using statistical software.***	**10**
5	**Estimating Parameters and Determining Sample Sizes:** Sampling and Sampling Distribution; Estimation of mean, variance and proportion for a single population; Error of estimation; Sample size determination; Estimation of the difference between 2 means, ratio of 2 variances and difference of 2 proportions for two populations. ***Applications using statistical software.***	**16**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Homework, Mini projects**	**During the semester**	**15%**
2.	**Midterm Exam**	**10thweek**	**25%**
3.	**Lab exam**	**14thweek**	**20%**
4.	**Final Exam**	**16th week**	**40%**

*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	***Elementary Statistics***, 14th edition; Mario F. Triola, Pearson, 2022. **(Main Reference).** ***Statistics for Environmental Science and Management,*** 2nd Edition, Bryan F. J. Manly, CRC Press, 2009.
Supportive References	***Analyzing Environmental Data***, Walter W. Piegorsch, A. John Bailer, John Wiley & Sons, Ltd., 2005.
Electronic Materials	**None**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each classroom should be equipped with a whiteboard and a projector.** ▪ **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (projector, smart board, software)	**The rooms should be equipped with a data show and Smart Board.** **All computers should be equipped with the following software:** • **Microsoft Excel** • **IBM SPSS** • **R-Project**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Each student will complete two evaluation forms during the semester and at the end of the course.**
Effectiveness of Students' assessment	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Quality of learning resources	**Students**	**Each student will complete two evaluation forms during the semester and at the end of the course.**

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Other	**None**	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**4/1446**
DATE	**06/03/1446 (09/09/2024)**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title: Basics of Chemistry
Course Code: CHM 1106
Program: Bachelor of Science in Environment Science
Department: Biology
College: Science
Institution: Imam Mohammad Ibn Saud Islamic University
Version: 1
Last Revision Date: -

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 4 (Lecture 2 +Lab 2+ Tutorial 2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 2/ First Year)					
4. Course General Description:					
This course provides the students with the fundamental principles of chemistry, including the atomic and molecular structure of matter, and the changes it undergoes through chemical reactions. The course addresses important topics including quantum chemistry, chemical bonding, stoichiometry, kinetics, chemical equilibrium, thermochemistry and thermodynamics, molecular structure and function, electrochemistry, and the periodic chemical properties of the elements. State functions, energy, properties of solutions, states of matter, and properties of acids and bases are also among the course topics. The course emphasizes the classification of matter by its state and bonding behavior using the Periodic Table as a reference.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The course aims to introduce the students to Chemistry, how it can be applied to describe substances and processes in nature and how this knowledge can be applied in scientific problem-solving. The course gives the student an understanding of the building blocks and properties of chemical substances, and how they are involved in different types of chemical reactions. The acquired course knowledge enables the students to compare and contrast the chemical behavior and physical properties of common substances and solve quantitative problems (stoichiometric) involving chemical formulas and equations.					

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**	30
5.	**Others (specify)**	0
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	**Discuss the fundamentals of the current theories in the subfields of chemistry including inorganic, organic, and physical chemistry**	**K1**	-Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations
1.2	**Describe the properties of different substances and their reactivity patterns, chemical**	**K2**	-Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	bonds in molecules, and chemical equilibrium			
1.3	Clarify the rates of chemical reactions and how energy transfers in these reactions	K3	-Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations
1.4	Explain the electronic and molecular structures of common substances using the proper models.	K2, K3	-Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations
2.0	**Skills**			
2.1	Relate between the basic concepts of chemistry and the real-world applications to solve emerging problems	S1	--Weekly- lectures -Demonstrations -Group discussions	
2.1	Investigate the qualitative and quantitative relationships between matter and energy involved in chemical or physical processes.	S2	-Lab sessions Demonstrations -Group Discussions	-Lab reports -Presentations
2.2	Design and perform research experiments in chemistry by employing practical skills, methodologies, and convenient equipment.	S3	-Lab sessions Demonstrations -Group Discussions	-Lab reports -Presentations

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	**Interpret and evaluate the chemical data based on critical thinking, and analyze the data by applying the appropriate statistical methods**	**S2, S3**	-Lab sessions Demonstrations -Group Discussions	-Lab reports -Presentations
3.0	**Values, autonomy, and responsibility**			
3.1	**Show the ability to work independently and to collaborate effectively in a team**	**V1**	-Lab sessions Demonstrations -Group Discussions	-Lab reports -Presentations
3.2	**Demonstrate the ability to prepare organized and concise scientific data, and communicate information through written reports and oral presentations to varied audience**	**V2**	-Lab sessions Demonstrations -Group Discussions	-Lab reports -Presentations
3.3	**Adhere to the ethical rules while performing scientific activities in the field of chemistry**	**V3**	-Group Discussions	-Reports -Presentations

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	**The Study of Change:** Science for the twenty-first century, the study of chemistry, the scientific method and hypothesis, a law and theory, matter and substance, mixture, physical means, elements and compounds, classification of matter, the three states of matter, Types of changes, Physical and chemical properties of matter, Extensive and Intensive properties, Measurement, handling numbers, Accuracy and precision.	8
2.	**Atoms, Molecules and Ions:** The structure of the atom, atomic number, Masse number, Isotopes, The periodic table, Molecules and ions, Formulas and models, Chemical formulas, molecular formula, empirical formula, Formula of Ionic compounds, Chemical nomenclature, Naming compounds, Organic chemistry.	6
3.	**Masse Relationships in chemical reactions (Stoichiometry):** The mole, Avogadro's number, Molar mass, Molecular mass, Formula mass, the mass spectrometer, Percent composition and empirical formula, Experimental determination of empirical formulas, Chemical reaction, Chemical equations, balancing chemical equations, amounts of reaction and reactants and products, Reaction Yield, Limiting reagents.	6
4.	**Reaction in aqueous solutions:** General proprieties of aqueous solutions, Solution, solute, solvent, An electrolyte and nonelectrolyte, Precipitation reactions, Solubility, Properties of acids, Properties of bases, Arrhenius acid and base, Brønsted acid and base, Neutralization reaction. Oxidation-reduction reactions, Oxidation number, Types of oxidation-reduction reactions, Solution Stoichiometry, Concentration, dilution, indicators, Equivalence point, Gravimetric analysis, Acid-base titrations, Redox titrations.	6
5.	**Gases:** Physical characteristics of gases, Units of pressure, Boyle's law, Charles' & Gay-Lussac's Law, Avogadro's law, and the gas laws. The ideal gas equation, Gas stoichiometry, Dalton's law of partial pressures.	4
Total		**30**

Exp	List of Topics (Lab)	Contact Hours
1.	Density of liquids & Density of regular and irregular solids.	4
2.	Stoichiometry: Mass-mass relationship.	**4**
3.	The chemical composition by mass percentage.	**4**
4.	Preparation of primary standard and dilution rule & titration.	4
5.	Strong acid-strong base titration.	4
6.	Vinegar Analysis, Mass %.	2
7.	Reactions in Aqueous Solutions & Precipitation reaction & Limiting reactant.	2
8.	Determination of the specific heat of metal.	2
9.	Revision.	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Midterm Exam 1**	5th week	15%
2.	**Midterm Exam 2**	10th week	15%
3.	**Quizzes, Attendance, Participation, Assignments**	During the semester	10%
4.	**Lab Exam**	14th week	20%
	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	**Analytical Chemistry, Gary D. Christian,** Purnendu K. (Sandy) Dasgupta, Kevin A. Schug. 7th Edition. ISBN: 978-0-470-88757-8.
Supportive References	**Fundamentals of analytical chemistry,** Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, 9th Edition. ISBN-13: 978-0-495-55828-6.
Electronic Materials	-
Other Learning Materials	-

2. Required Facilities and Equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, Laboratories
Technology equipment (projector, smart board, software)	Projector, Smartboard
Other equipment (depending on the nature of the specialty)	Equipment related to chemistry

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Direct
Effectiveness of Students' assessment	Program Leader	indirect
Quality of learning resources	Peer Reviewers	Indirect
The extent to which CLOs have been achieved	Program Leader	Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**COUNCIL OF CHEMISTRY**
REFERENCE NO.	**7**
DATE	**1446/03/29هـ**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Plant Ecosystems
Course Code:	EVS 1120
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 2 / First year)					

4. Course General Description:

The earth can be divided up into different types of areas with shared characteristics. The simplest division is that into areas covered by water and areas covered by dry land. This division is based upon simple physical characteristics. There are many other ways of dividing up regions which are far more complex; based upon not just physical characteristics but also the living things that inhabit an area. Regions of the world can be differentiated according to environmental conditions, topography, different plants, animals, microbes, and all other organisms, and all their interrelationships, these are called ecosystems. Different ecosystems (ecological systems) can be distinguished: forest ecosystem, grassland ecosystem, desert ecosystem, tundra ecosystem (polar and high mountains), aquatic ecosystem (freshwater ecosystem, marine ecosystem). Each of these ecosystems will be developed according to their different types, characteristics, components, and functions. The plant palette varies with the ecosystem because this requires the adaptation of various plant species to the specific conditions of each ecosystem. The physiology of the plant varies in this case and we will explain, for each ecosystem, the physiological behavior of plants allowing them their adaptation to the specificities of the environment.

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

EVS1110 EVS 1112 EVS1114

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

None

7. Course Main Objective(s):

The structure of the course ensures that students can acquire the required skills for different plant ecosystems. The objectives of this course are to provide a basic understanding of the characteristics, components, and functions of various plant ecosystems permitting to:
- explain the importance of plants as energy producers within ecosystems,
- describe the effects of plant association and competition on the succession of plants and how they respond to environmental stresses,
- describe the effects of a range of biotic and abiotic environmental factors on plant growth and development,
- relate plant distribution, growth and natural selection to soil, geography, weather and climate,
- explain how planning, environmental assessment and impact analysis may contribute to the conservation process,
- explore how human activities can negatively affect natural ecosystems,
- learn how humans can reduce their impacts on the environment.

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 the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**			
1.1	Demonstrate a broad and coherent understanding of ecosystems and their different types.	K1-K3	Weekly lectures Class discussions	Quizzes, midterm exams, and final exam
1.2	Outline the diversity and distribution of plants in several ecosystems, including land, water, desert, grassland, and forest.	K2-K3	Weekly lectures Class discussions	Quizzes, midterm exams, and final exam
1.3	Describe a broad and coherent theoretical and practical knowledge through implementing appropriate methodologies for studying plant ecosystems.	K2-K3	Weekly lectures Class discussions	Quizzes, midterm exams, and final exam
1.4	Explain the role of ecological systems in shaping the evolution of plant life histories.	K2-K4	Weekly lectures Class discussions	Quizzes, midterm exams, and final exam
2.0	Skills			
2.1	Evaluate the different factors affecting the plant in the environment.	S1-S2	Weekly lectures Class discussions	Lab reports and Lab exam
2.2	Relate plant distribution, growth and natural selection to soil, geography, weather and climate.	S1-S2	Weekly lectures Class discussions	Lab reports and Lab exam

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
2.3	Analyse the factors leading to environmental degradation, their reasons and their impact on the environment.	S2-S3-S4	Weekly lectures Class discussions	Lab reports and Lab exam
2.4	Interpret the concepts, types, development, and functions of various plant ecosystems.	S3-S4	Weekly lectures Class discussions	Lab reports and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate independence and cooperate effectively with the research team.	V1	Presentations	Presentations, reports, seminars
3.2	Share in the discussion of scientific issues in the field of plant ecosystems.	V2-V3-V4	Presentations	Presentations, reports, seminars
3.3	Show the ability to present plant environment-related information through different modes to various audiences.	V2-V3	Presentations	Presentations, reports, seminars

C. Course Content

No	List of Topics	Contact Hours
1.	**Forest ecosystem** - Definition - Native plant communities - Forest succession - Components of forest ecosystem - Types of forest ecosystem * Tropical forest ecosystem	**8**

	* Temperate forest ecosystem * Taiga/Boreal forest ecosystem - Plant physiology in a forest ecosystem - Effects of human activities on forest ecosystem	
2.	**Grassland ecosystem** - Definition - Native plant communities - Components of grassland ecosystem - Types of grassland ecosystem * Desert grasslands * Flooded grasslands * Montane grasslands * Tropical grasslands * Temperate grasslands - Plant physiology in a grassland ecosystem - Effects of human activities on grassland ecosystem	**6**
3.	**Desert ecosystem** - Definition - Native plant communities - Components of desert ecosystem - Types of desert ecosystem * Hot and dry desert ecosystem * Semi-arid desert ecosystem * Coastal desert ecosystem * Cold desert ecosystem - Plant physiology in a desert ecosystem - Effects of human activities on desert ecosystem	**4**
4.	**Tundra ecosystem (polar and high mountains)** - Definition - Native plant communities - Components of tundra ecosystem - Types of tundra ecosystem * Arctic tundra * Alpine tundra * Antarctic tundra - Plant physiology in a tundra ecosystem - Effects of human activities on tundra ecosystem	**4**

5.	**Aquatic ecosystem** - Definition - Native plant communities - Components of aquatic ecosystem - Types of aquatic ecosystem * Freshwater ecosystem • Lotic ecosystem • Lentic ecosystem • Swamps and wetlands ecosystem * Marine ecosystem • Ocean ecosystem • Coastal ecosystem • Estuaries ecosystem • Coral reefs ecosystem - Plant physiology in an aquatic ecosystem - Effects of human activities on aquatic ecosystem	**8**
Total		**30**

No	List of Topics (Labs)	Contact Hours
1.	Study of some plant species in a forest ecosystem	**4**
2.	How to limit negative impacts of human activities on forest ecosystem?	**4**
3.	Study of some plant species in a grassland ecosystem	**2**
4.	How to limit negative impacts of human activities on grassland ecosystem?	**4**
5.	Study of some plant species in a desert ecosystem	**4**
6.	How to limit negative impacts of human activities on desert ecosystem?	**4**
7.	Study of some plant species in a tundra ecosystem	**2**
8.	How to limit negative impacts of human activities on tundra ecosystem?	**2**
9.	Study of some plant species in an aquatic ecosystem	**2**
10.	How to limit negative impacts of human activities on aquatic ecosystem?	**2**
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	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	- Grime G.P., 2001. Plant strategies, vegetation processes, and ecosystems properties, Publisher: Wiley, Second edition, 417 pages, ISBN: 9780470850404, 047085040X. - Smith T. M., Shugart H. H., Woodward F. I., 1997. Plant functional types. Their relevance to ecosystem properties and global change, 388 pages, ISBN: 9780521566438. - Chapin III F.S., Matson P.A., Vitousek P.M., 2011. Principles of terrestrial ecosystem ecology, Springer New York, Second edition, 529 pages, ISBN: 9781441995049, 1441995048. - Schulze E.D., Beck E., Buchmann N., Clemens S., Müller-Hohenstein K., Scherer-Lorenzen M., 2019. Plant ecology, second edition, Springer, 928 pages, ISBN 978-3-662-56231-4. - Mahalingam R., 2014. Plant ecosystem, Agrotech Press, ISBN-10 : 9383101741. - Lack A., 2022. Plant ecology and conservation, Publisher: Garland Science, 328 pages, ISBN: 1000597881, 9781000597882. - Maarel E. van der, Franklin J., 2012. Vegetation ecology, Publisher: Wiley Blackwell, 576 pages, ISBN: 9781118452486, 1118452488.

Supportive References	- Larcher W., 2003. Physiological plant ecology, 4th edition, Springer, 513 pages, ISBN: 9783540435167, 3540435166. - Kurzius A., 2019. Plants and ecosystems, Publisher: Scholastic Incorporated, 48 pages, ISBN: 9780531234648, 0531234649.
Electronic Materials	-
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, Laboratories
Technology equipment (projector, smart board, software)	Projector and Smartboard
Other equipment (depending on the nature of the specialty)	-

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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title: **Statistical Analysis of Environmental Data (2)**	
Course Code: **STA 1213**	
Program: **Bachelor of Science in Environmental Science**	
Department: **Biology**	
College: **Science**	
Institution: **Imam Mohammad Ibn Saud Islamic University**	
Version: **2024 – V1**	
Last Revision Date: **None**	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (Lecture 2 + Lab 2 + Tutorial 0)

2. Course type

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

3. Level/year at which this course is offered: Level 3 / Year 2

4. Course general Description:

The course covers the statistical tests for parametric, non-parametric and binomial data, linear and non-linear regression approaches, Goodness-of-Fit and contingency tables, one-way ANOVA, two-way ANOVA.
Furthermore, students will acquire practical skills in utilizing statistical software tools by engaging in weekly discussions. Students are required to develop proficiency in coding activities, data manipulation, and effectively communicating their quantitative analyses.

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

STA 1112

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

7. Course Main Objective(s):

- Test hypotheses on the different parameters, using the corresponding tests to analyze environmental data.
- Compute power and type II error probability and make sample size selection decisions for tests on different parameters involving one and two samples.
- Apply statistical methods to real-world environmental problems, such as pollution assessment, biodiversity studies, and climate change impact analysis.
- Structure comparative experiments involving two samples as hypothesis tests.
- Use simple linear and multiple regression for building empirical models that can be used to predict and understand complex environmental systems and phenomena.
- Use the chi-square goodness-of-fit test to check distributional assumptions, and contingency table tests.
- Understand how the analysis of variance is used to analyze the data from these experiments.
- Develop students' ability to effectively communicate statistical findings to both technical and non-technical audiences, emphasizing the importance of data visualization and clear reporting.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	**0**	**0%**
4	Distance learning	**0**	**0%**

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	**To state hypothesis tests in some common models (including Normal models), correctly using the terms null hypothesis, alternative hypothesis, test statistic, rejection region, significance level, power, and p-value.**	**K1, K2**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**
1.2	**Describe how correlation is used to identify relationships between variables.**	**K1, K2**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**
1.3	**Describe how regression analysis is**	**K1, K2**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	used to predict outcomes.			Assignments, Practical exam
1.4	To state the assumptions for one-way ANOVA, two-way ANOVA the analysis of variance and nonparametric statistics.	K1, K2	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
2.0	**Skills**			
2.1	To appraise the results of test hypothesis, linear regression, multiple linear regression analyses using a statistical software package.	S	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
2.2	To explain the results of ANOVAs using statistical software for the case of between-subjects, repeated measures, and, when applicable, mixed designs, and conduct appropriate follow-up and simple effects analysis.	S3, S4	Lecturing, Interactive learning.	Assignments, Practical exam
2.3	To differentiate between research questions that require the implementation of statistical analyses.	S2, S3	Lecturing, Interactive learning.	Assignments, Practical exam
2.4	To interpret the results of statistical analysis using a statistical software package.	S1	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
3.0	**Values, autonomy, and responsibility**			
3.1	To show collaborative approaches in data analysis projects, valuing diverse perspectives and fostering an inclusive learning environment.	V1	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam

Code	*Course Learning Outcomes*	*Code of CLOs aligned with program*	*Teaching Strategies*	*Assessment Methods*
3.2	**To draw decisions based on data analysis and understand their findings' broader environmental and social implications.**	**V2**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**
3.3	**Demonstrate a commitment to ethical standards in data collection, analysis, and reporting, ensuring transparency and integrity in environmental research.**	**V4**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**

C. Course Content

No	List of Topics	Contact Hours
1	**Introduction:** Normal Distribution, Sampling distribution of sample statistic, and Interval Estimation–large Samples.	**2**
2	**Hypothesis Testing:** Basics of Hypothesis Testing, Testing a Claim About a Proportion, Testing a Claim About a Mean: σ known, Testing a Claim About a Mean: σ not known, Testing a Claim About Variation. ***Applications using statistical software.***	**10**
3	**Inferences from Two Samples:** Inferences about two Proportions, Inferences about two Means: Independent Samples, Inferences from Dependent Samples, Comparing Variation in two Samples. ***Applications using statistical software.***	**10**
4	**Correlation and Regression:** Correlation, Regression, Variation and Prediction Intervals, Multiple Regression, Modeling. ***Applications using statistical software.***	**10**
5	**Goodness-of-Fit and Contingency Tables:** Goodness-of-Fit, Contingency Tables, McNemar's Test for Matched Pairs. ***Applications using statistical software.***	**10**
6	**Analysis of Variance:** One-Way ANOVA, Two-Way ANOVA. ***Applications using statistical software.***	**8**
7	**Nonparametric Statistics:** Sign Test; Wilcoxon Signed Ranks Test for Matched Pairs; Wilcoxon Ranked-Sum Test for Two Independent Samples; Kruskal-Wallis Test; Rank Correlation; Runs Test for Randomness, ***Applications using statistical software.***	**10**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Homework, Mini projects**	**During the semester**	**15%**
2.	**Midterm Exam**	**5th week**	**25%**
3.	**Lab exam**	**14th week**	**20%**
4.	**Final Exam**	**16th week**	**40%**

*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	***Elementary Statistics***, 14th edition; Mario F. Triola, Pearson, 2022. **(Main Reference).** ***Statistics for Environmental Science and Management,*** 2nd Edition, Bryan F. J. Manly, CRC Press, 2009. **(Main Reference).**
Supportive References	***Analyzing Environmental Data***, Walter W. Piegorsch, A. John Bailer, John Wiley & Sons, Ltd., 2005.
Electronic Materials	**None**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each classroom should be equipped with a whiteboard and a projector.** ▪ **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (projector, smart board, software)	**The rooms should be equipped with a data show and Smart Board.** **All computers should be equipped with the following software:** • **Microsoft Excel** • **IBM SPSS** • **R-Project**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Each student will complete two evaluation forms during the semester and at the end of the course.**
Effectiveness of Students assessment	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Quality of learning resources	**Students**	**Each student will complete two evaluation forms during the semester and at the end of the course.**
The extent to which CLOs have been achieved	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Other	**None**	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**4/1446**
DATE	**06/03/1446 (09/09/2024)**

Course Specification
(Bachelor)

Course Title:	Biodiversity
Course Code:	EVS 1230
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 3 / 2nd Year)					

4. Course General Description:

This course deals with biodiversity; and the definition of species; Measuring biodiversity (Units of biodiversity, Levels of biodiversity, Biodiversity indices) Importance of biodiversity in Saudi Arabia (values of biodiversity); Threats to biodiversity; Impacts of biodiversity loss; Extinction; Biodiversity hotspots; Conservation of biodiversity (protected areas in KSA and Arab countries).

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

EVS 1110 EVS 1112 EVS 1114

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

None

7. Course Main Objective(s):

Identify and describe the fundamentals concepts of biodiversity. - Discuss the different categories of biological diversity. - Distinguish levels of biodiversity in ecosystems. - Identify the main factors that threaten biodiversity. - Describe threats, management, and conservation of biodiversity.

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	**Describe the basic concept of biodiversity.**	K1	Interactive lecture. Discussion and dialogue.	Written tests. Oral tests.
1.2	**Recognize the importance of biodiversity.**	K2	Collaborative learning.	Classroom assignments. Home assignments.
2.0	**Skills**			
1.2	**Use computers and internet to explain**	S1	Find the collective	Participation through class

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	the threats that biodiversity confronts.		Reciprocal teaching	work and homework.
2.2	**Analyze scientific biodiversity management strategies.**	S2	Encourage Students to communicate their biology thinking to ask and answer questions when they arise.	Quizzes, midterm exams, project presentations and final exam
2.3	**Evaluate of biodiversity in Saudi Arabia**	S3	Collective research project and writing reports and presenting its display.	Quizzes, midterm exam and final exam.
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate the ability to work independently and cooperate with a team.**	V1	Collaborative learning.	Organized observation.
3.2	**Participate in discussion of scientific issues and present data through oral presentation or written format**	V2	Collective research project and writing reports and presenting its display.	Assigning students to conduct research using the internet and modern technology.
3.3	**Adhere to the relevant ethical regulations**	V3	Collaborative learning.	Organized observation.

C. Course Content

No	List of Topics	Contact Hours
1.	The basic concept of biodiversity	4
2.	Historical brief of biodiversity	4
3.	Biodiversity at different levels of ecosystems	4
4.	Importance of biodiversity	2
5.	Factors affecting biodiversity	2
6.	Biodiversity degradation	3
7.	Different environments and biodiversity	3
8.	Biodiversity in the Kingdom of Saudi Arabia	2
9.	Species Extinction, endangered species, causes of species extinctions	2
10.	Biodiversity conservation strategies– general methods protected areas (local law - regional conventions – international conventions) .	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Midterm exam 1**	Around 6th - 7th week	15%
2.	**Midterm exam 2**	Around 11th - 12th week	15%
3.	**Quizzes, Attendance, Participation, Assignments, Data search**	All the semester	10%
4.	**Final Lab exam**	15th week	20%
4.	**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. Science for Environment Policy (2015). Ecosystem Services and the Environment. In-depth Report 11 produced for the European Commission, DG Environment by the Science Communication Unit, UWE, Bristol. 2. European Commission (2013). Mapping and Assessment of Ecosystems and their Services. An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020. Technical Report – Discussion paper 3. European Commission (2014). Mapping and Assessment of Ecosystems and their Services. Indicators for ecosystem assessments under Action 5 of the EU Biodiversity strategy to 2020. Technical Report - Discussion paper
Supportive References	1. Maczulak, A. (2010). Biodiversity: Conserving Endangered Species. ISBN-10: 0-8160-7197-7. 2. Van Dyke, F. (2008). Conservation Biology: Foundations, Concepts, Applications. 2nd Edition. Springer. ISBN: 978-1-4020-6890-4. 3. Magurran, A. E. (2004). Measuring Biological Diversity. Blackwell Publishing. ISBN-13: 978-0-632-05633-0 4. Mora et al. (2011). How Many Species Are There on Earth and in the Ocean? PLoS Biology, 9, e1001127.
Electronic Materials	http://archive.wri.org/biodiv/biolinks.html http://www.cbd.int/ http://www.iucn.org/ http://www.iucnredlist.org/ http://www.conservation.org/where/priority_areas/hotspots/Pages/ hotspots_main.aspx http://www.edgeofexistence.org/index.php
Other Learning Materials	Videos, slides and presentations that are available with the instructor.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector and Smartboard
Other equipment (depending on the nature of the specialty)	Biodiversity -related instruments

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of Student 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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Conservation Biology and Bioextinction
Course Code:	EVS 1232
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 3/ 2nd Year)					

4. Course general Description:

This course explores the evolution of key elements in conservation-focused. studies involving biodiversity patterns, extinction trends, genetics for conservation, and population conservation efforts in communities, landscapes, and the sustainability of ecosystems. Nowadays, humans have triggered an unparalleled reshuffling of the earth's biota. We purposely and accidentally continue to spread a growing number of species across environmental barriers that were once thought impossible to overcome. Successful introductions typically have negative impacts on ecosystem function, biodiversity, and ecosystem services, with invasion being considered a significant current natural disaster.

The course ‘Conservation Biology and Bioextinction’ will focus on non-native alien species, examining what causes them to rapidly increase in population and have harmful effects on the ecosystem in their new habitat, leading to the extinction of other susceptible species. It will establish direct links between basic principles in ecology and evolutionary biology, issues relevant to extinction and invasion ecology, and the unique characteristics of individual invasive species. Therefore, the primary objective is to highlight species extinction's ecological significance and explore related sociological, economic, and associated topics.

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):

Conservation Biology and Bioextinction' is an advanced general survey course that familiarizes students with the main concepts. Services and issues related to the protection and recovery of wildlife are the main objectives of the course project. The focus of the course is to build a plan for conserving the habitats of multiple species.

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 Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the procedures for examining the preservation of species, biodiversity, and the prevention of extinction.	**K1**	Lecture and take-home research assignment	Quizzes, midterm exams and final exam
1.2	Discuss the rules, guidelines, and agreements that address the conservation biology issues.	**K2**	Lecture and take-home research assignment	Quizzes, midterm exams, and final exam
1.3	Explain the importance of conservation genetics theory in promoting biological conservation efforts.	**K3**	Lecture and take-home research assignment	Quizzes, midterm exams, and final exam
2.0	**Skills**			
2.1	Apply quantitative techniques for conducting population viability analyses.	**S1**	Take-home research assignment	Reports
2.2	Use quantitative methods to analyze population viability and biodiversity.	**S2**	Take-home research assignment	Reports
2.3	Evaluate strategies that can be defended in order	**S3**	Take-home research assignment	Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	to conserve a species or a system that is of concern.			
3.0	**Values, autonomy, and responsibility**			
3.1	Share in the discussion of the literature articles in the field of conservation biology and use using scientific evidence deduced from raw data to support their position to an audience of peers.	**V1**	Take-home research assignment	Quizzes, midterm exams, Lab reports, project presentations, Lab exams and final exam
3.2	Show the ability to communicate endemic and invasive taxa-related information to various audiences in an accurate, compelling, and logically supported manner, via writing and talks.	**V2**	Take-home research assignment	Quizzes, midterm exams, Lab reports, project presentations, Lab exams and final exam
3.3	Adhere to the relevant ethical rules	**V3**	Take-home research assignment	Quizzes, midterm exams, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Introduction to Conservation Biology: 1. What is Biodiversity? 2. Threats of biodiversity: Overexploitation, Invasive Species, Disease	4
2.	Biodiversity loss and its consequences 1. Estimates of extinction rates worldwide and in Saudi Arabia 2. Analyzing and discussing causes of extinction 3. Summarizing causes of vulnerability to extinction and consequences 4. Changing of the environment and loss of gene pool and ecosystem services and livelihood	4
3.	Invasive alien species	4
4.	Biological invasion process 1. Transport 2. Introduction 3. Establishment 4. Spread 5. The management-invasion continuum	2
5.	Theories and concepts of invasion biology 1. Spread, establishment, and impacts of alien species 2. Climate and habitat match of alien species 3. Biology of high-impact invaders 4. Risk assessment of alien species 5. Management of biological invasions	2
6.	Socioecological Context 1. Characterizing stakeholders and biological invasion stages 2. Perceptions and values 3. Ethics and invasive alien species	2
7.	Conceptual basis for the invasive alien species assessment 1. Literature review 2. Key issues in the discussion of biological invasions	2
8.	Bioinvasion and Bioextinction: Red and Mediterranean Seas	2
9.	Protected Areas: Establishment, Design, and Management	2
10.	Protected Areas vs. Unprotected Lands	2
11.	Conservation Outside of Protected Lands International Conservation	2
12.	The Challenge of Sustainable Development Conservation Biology and Ethics	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.	Final Lab Exam	15th week	20%
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	• Biodiversity: An Introduction by Gaston and Spicer, 2nd ed. (2004) • The Challenges of Biodiversity Science by Loreau (2010) • Kull, C. A. (2018). Critical Invasion Science: Weeds, Pests, and Aliens. In R. Lave, C. Biermann, & S. N. Lane (Eds.), The Palgrave Handbook of Critical Physical Geography (pp. 249–272). Springer International Publishing. • Bellard, C., Cassey, P., & Blackburn, T. M. (2016). Alien species as a driver of recent extinctions. Biology Letters, 12(2), 20150623. • Pimm, S. L., Jenkins, C. N., Abell, R., Brooks, T. M., Gittleman, J. L., Joppa, L. N., Raven, P. H., Roberts, C. M., & Sexton, J. O. (2014). The biodiversity of species and their rates of extinction, distribution, and protection. Science, 344(6187), 1246752. • Gurevitch, J., & Padilla, D. K. (2004). Are invasive species a major cause of extinctions?. Trends in ecology & evolution, 19(9), 470-474. • Smith, K. F., Sax, D. F., & Lafferty, K. D. (2006). Evidence for the role of infectious disease in species extinction and endangerment. Conservation biology, 20(5), 1349-1357.
Supportive References	None
Electronic Materials	• USDA National Invasive Species Information Center: http://www.invasivespeciesinfo.gov/

	• Florida: https://www.invasivespeciesinfo.gov/us/florida • US Forest Service Invasive Species Program: http://www.fs.fed.us/invasivespecies/ • US Geological Service Non-Indigenous Aquatic Species: http://nas.er.usgs.gov/ • International Union for the Conservation of Nature (IUCN) Invasive Species Specialist Group: http://www.issg.org/ • Florida Natural Areas Inventory – Invasive Species: https://www.fnai.org/invasivespecies.cfm • Center for Aquatic and Invasive Plants, University of Florida: https://plants.ifas.ufl.edu/ • Florida Exotic Pest Plant Council: https://www.fleppc.org/ • Florida Invasive Plant species mobile field guide: http://www.plantatlas.usf.edu/flip/
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	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/2/1446H**

Course Specification

(Bachelor)

Course Title:	**Environmental Analytical Chemistry**
Course Code:	**CHM 1205**
Program:	**Bachelor of Science in Environmental Science**
Department:	**Biology**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**1**
Last Revision Date:	**-**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 4 (Lecture 3 + Lab 3 + Tutorial 0)					
2. Course type					
A.	☐University	☒ College	☐ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (Level 3/ 2nd Year)					

4. Course General Description:
This course introduces the students to the basic principles of environmental chemistry. The course focuses on the chemistry of air, water, and soil with specific emphasis on the effects of human-made chemical products and by-products on the environmental processes. The interconnections between different sectors of the environment (soil, water, atmosphere) and the effect of human activities on the natural chemical processes are emphasized. During this course the chemistry of the air, water and soil is studied with an emphasis on the environmental fate of anthropogenic chemicals released into the environment. The course encompasses the knowledge derived from atmospheric chemistry, hydrosphere chemistry, water chemistry, biosphere chemistry, toxic organic compounds and metals, and soil chemistry. Connections with green chemistry are also highlighted.
5. Pre-requirements for this course (if any)**:**
CHM 1101 Basics of Chemistry
6. Co-requisites for this course (if any)**:**
None
7. Course Main Objective(s):
The main aim of the course is to equip students with knowledge of the chemical properties of elements and compounds, as well as the chemical reactions essential for the cycling and accumulation of chemicals in the environment. The course also aims to address the chemistry of elements and compounds in the atmosphere, water and soil, and lays special emphasis on the processes that define the connections and the dependence between individual segments of environment.

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**	45
2.	**Laboratory/Studio**	45
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	**Identify the relative importance of various reactions, physical processes and transport mechanisms affecting different chemicals in the environment.**	**K1**	-Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	**Clarify the relationships between the chemical exposures and challenges related to human activities, and their effects on the various segments of the environment**	**K2**	Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations
1.3	**Outline the chemistry of elements and compounds in the atmosphere, water, and soil, and describe the principles of solid-, liquid-, and gaseous-state environmental chemistry.**	**K3**	Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations
1.4	**Explain how to use chemistry knowledge to find the most proper management methods to ensure sustainable Earth resources.**	**K2, K2**	Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	**Apply the concepts and synthesize the hypotheses from multiple disciplines in environmental chemistry**	**S1**	Weekly- lectures -Demonstrations	-Assignments -Written Exams -Presentations -Data Search -Participations
2.2	**Employ the technical skills to quantify the effects of hazardous chemicals in the environment.**	**S2**	-Lab sessions Demonstrations -Group Discussions	-Lab reports -Presentations
2.3	**Design the plans necessary to study the dose-response relationships of the various chemical compounds and assess their impacts on the environment**	**S2**	-Lab sessions -Lab Demonstrations -Group Discussions	-Lab reports -Presentations
2.4	**Interpret and analyze the environmental research data using the appropriate statistical methods.**	**S3**	-Lab sessions -Lab Demonstrations -Group Discussions	-Lab reports -Presentations
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate the ability to work independently and cooperate in a team**	**V1**	-Lab sessions -Lab Demonstrations -Group Discussions	-Lab reports -Presentations

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	**Share in the specialized meetings and present the scientific data professionally through oral presentations and written forms.**	**V1**	-Lab sessions -Lab Demonstrations -Group Discussions	-Lab reports -Presentations
3.3	**Adhere to the relevant ethical rules while performing a research work in chemistry**	**V3**	-Lab sessions -Lab Demonstrations -Group Discussions	-Lab reports -Presentations

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	**General introduction to environmental chemistry:** Water pollution: Nature and types of water pollutants - elemental pollutants - heavy metals - metalloids - organic and inorganic species - acidity, alkalinity and salinity - oxygen, oxidants and reductants - pesticides, polychlorinated biphenyls and radionuclides in the aquatic environment.	**9**
2.	**Review the basic calculations of analytical chemistry (chemical concentrations and stoichiometry relationship):** General steps in chemical analysis, Measurements, Fundamental SI units, Derived SI units, other units, Conversion to SI units, Prefixes, Chemical concentrations, Molarity, Molality, Percentage composition, ppm and ppb, Preparing Solutions, Dilution, Stoichiometry Calculations.	**9**
3.	**Acid/Base Titrations: Titration:** methods of end point determination, acid – base titrations, titration of strong acid with strong base. **Oxidation/Reduction Titrations:** Basic concepts of Redox reactions, Redox titrations. **Complexometric Titrations:** EDTA titrations, metal chelate complexes, acid-base properties of EDTA, EDTA complexes, EDTA titration curves, regions of equivalence point, before, at and after equivalence point, titration calculations, metal ion indicators, EDTA titrations techniques, direct, indirect, displacement and back titrations, water hardness, masking.	**12**

	Precipitation Titrations: Precipitation titration curve, Methods of Precipitation Titrations: Mohr's method, Volhard's Method, Fajan's method. Calculations.	
5.	**Gravimetric Analysis:** A successful Gravimetric Analysis: Preparation of the solution, The Precipitation, Digest the Precipitate, Washing and Filtering, Drying or Igniting, Gravimetric Calculations.	**6**
6.	**Spectrophotometric analysis** Basic concepts of electromagnetic radiations with materials; Bear's low; evaluation methods driven from Bear's low including comparative method, standard calibration curve, standard addition method. Uv-vis-spectrophotometry, components, operation, and applications in qualitative and quantitative analysis. Flame photometry: components, operation, and applications in qualitative and quantitative analysis	**9**
Total		**45**

Exp	List of Topics (Labs)	Contact Hours
1.	Safety and Laboratory equipment and measurements and reports & Introduction to UV-Vis spectrometer and its operation.	6
2.	Preparing Chemical Solutions by Physical Methods (w/v%, g/L, ppm) Making a standard solution using solid reagents.	**6**
3.	Preparation and standardization of solutions by Chemical method [Molarity, Normality and molality].	**6**
4.	Determination of the Hardness of Natural Waters: A: Conventional EDTA Complexometric Titration.	6
5.	Determination of Chloride Content in Seawater and Tap-water by the Mohr Method.	6
6.	Determination of Sulfate ions in water sample	6
7.	Determination of Iron in a water sample via spectrophotometer	2
8.	Determination of Potassium in water via flame photometer	2
9.	Determination of Sodium and potassium in a blood sample via flame photometer.	2
10.	Revision.	3
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Midterm Exam 1**	5th week	15%
2.	**Midterm Exam 2**	10th week	15%
3.	**Quizzes, Attendance, Participation, Assignments**	During the semester	10%
	Lab Exam	14th week	20%
4.	**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	**Analytical Chemistry, Gary D. Christian,** Purnendu K. (Sandy) Dasgupta, Kevin A. Schug. 7th Edition. ISBN: 978-0-470-88757-8.
Supportive References	**- Fundamentals of analytical chemistry,** Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, 9th Edition. ISBN-13: 978-0-495-55828-6 **- Environmental Chemistry**, S. A. Manahan, (7th Ed.), Boca Raton: CRC Press LLC, 2000, ISBN: 978-1-4398-3276-9.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab, classrooms
Technology equipment (projector, smart board, software)	Projector and smartboard
Other equipment (depending on the nature of the specialty)	Environmental chemistry equipment

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Direct
Effectiveness of Students' assessment	Program Leader	indirect
Quality of learning resources	Peer Reviewers	Indirect
The extent to which CLOs have been achieved	Program Leader	Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	COUNCIL OF CHEMISTRY
REFERENCE NO.	7
DATE	1446/03/29هـ

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Environmental Biotechnology
Course Code:	EVS 1240
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	
B.	☒ Required		☐ Elective		

3. Level/year at which this course is offered: (Level 4/ 2nd Year)

4. Course General Description:

This postgraduate course provides the candidates with a comprehensive understanding of the theoretical foundations, practical skills, and applications of Environmental Biotechnology. Welcome to the environmental Biotechnology course, where cutting-edge science meets the world of biotechnology. This course is designed to provide a comprehensive exploration of the principles and applications of biotechnology in Environmental sciences, aiming to equip students with the knowledge and skills needed to address the challenges and opportunities in the rapidly evolving field. From understanding the fundamentals of molecular biology and genetics to exploring advanced genetic engineering techniques, we delve into the intricate mechanisms that govern plant and microbial life. The course will cover the ethical, legal, and social dimensions of environmental biotechnology, ensuring a well-rounded perspective. As we navigate the landscape of genetic modification, plant breeding, and microbial biotechnology, we also examine the crucial role of biotechnology in enhancing crop yield, nutritional content, and overall food security. Through a blend of theoretical knowledge and hands-on laboratory experiences, students will gain practical insights into the world of Environmental biotechnology and its transformative impact on sustainable farming practices. Get ready to embark on a journey that merges scientific innovation with the imperative of feeding a growing global population.

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

EVS 1110

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

None

7. Course Main Objective(s):

The objective of this course is to provide the students with a comprehensive understanding of the theoretical foundations, practical skills, and applications of bioinformatics in the field of molecular biology and genomics. Through a combination of lectures, hands-on exercises, and projects, students will acquire various knowledge and skills.

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**	4
4.	**Tutorial**	0
5.	**Others (specify) ……**	0
	Total	60

B. Course Learning Outcomes, Teaching Strategies, Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Describe the fundamental principles and concepts of environmental biotechnology.**	**K1**	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams
1.2	**Explain the roles of microorganisms in environmental processes and their applications in biotechnology.**	**K2**	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.3	**Outline the mechanisms and techniques used in bioremediation, waste treatment, and pollution control.**	**K3**	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	**Analyze and interpret data from environmental biotechnology experiments and studies.**	**S1**	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	**Evaluate critically the potential benefits, limitations, and risks associated with environmental biotechnology applications.**	**S2**	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	**Formulate strategies for sustainable environmental management using biotechnological approaches.**	**S3**	-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	**Show independence and responsibility and cooperate effectively in a team to carry out research work**	**V1**	Group discussions	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
3.2	**Share in the discussion of scientific issues and present research results via oral presentations and in written format.**	**V2**	Group discussions	-Presentations -Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	**Introduction to Environmental Biotechnology:** Overview of Environmental biotechnology and its applications. Environmental issues and the role of biotechnology Principles of microbiology and cell biology	4
2.	**Bioremediation and Waste Treatment** Principles and mechanisms of bioremediation Bioremediation of soil, water, and air pollutants Biological treatment of solid and liquid wastes	4
3.	**Microbial Ecology and Biodiversity** Study of microbial communities and their roles in ecosystems Microbial interactions and ecosystem functions Biodiversity and its importance in environmental biotechnology	4
4.	**Biomass and Bioenergy** Biomass sources and conversion technologies Biofuels production (bioethanol, biodiesel, biogas) Biorefinery concepts and sustainability	4
5.	**Bioremediation and Waste Treatment:** Principles and mechanisms of bioremediation Bioremediation of soil, water, and air pollutants Biological treatment of solid and liquid wastes	4
6.	**Environmental Biotechnology:** Bioremediation and phytoremediation. Biotechnology for sustainable agriculture. Genetic modification for environmental benefits.	4

7.	**Environmental Biotechnology Applications:** Biotechnology in wastewater treatment Biomonitoring and biosensors Bioleaching and biomining Biodegradation of xenobiotics and recalcitrant compounds	4
8	**Biotechnology and Sustainable Development:** Biotechnology for sustainable agriculture Green chemistry and clean technologies Bioethics and biosafety considerations	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	*Rittmann, B.E. and McCarty, P.L. (2020) Environmental Biotechnology: Principles and Applications. 2nd edn. New York: McGraw-Hill Education.*

	Singh, J.S., Singh, D.P. and Pandey, V.C. (2017) Environmental Biotechnology: Theory and Applications. Boca Raton: CRC Press. Desai, C., Pathak, H. and Madamwar, D. (2010) 'Advances in molecular and "-omics" technologies to gauge microbial communities and bioremediation at xenobiotic/anthropogen contaminated sites', Bioresource Technology, 101(6), pp. 1558-1569. Book Chapters: Martínez-Toledo, A., Rodríguez-Vázquez, R. and Garzón-Zúñiga, M.A. (2017) 'Environmental Biotechnology', in Singh, R.L. and Singh, P.K. (eds.) Introduction to Environmental Biotechnology. Singapore: Springer, pp. 1-22. Singh, J.S. and Singh, D.P. (2012) 'Decontamination of environmental pollutants using naturally occurring and genetically engineered microorganisms', in Singh, S.N. (ed.) Environmental Biotechnology. New Delhi: APH Publishing Corporation, pp. 93-116. These references cover various aspects of environmental biotechnology, including principles, applications, bioremediation, genetically engineered organisms, and molecular techniques, providing a comprehensive overview of the field.
Supportive References	For an Environmental Biotechnology course, there are several reputable online resources that cover a wide range of topics in the field. Here are some valuable online resources that you may find useful: 1. **National Center for Biotechnology Information (NCBI)** • Website: NCBI • NCBI provides access to a vast collection of biological databases, including GenBank and PubMed, which can be valuable for researching genetic information and scientific literature. 2. **International Service for the Acquisition of Agri-biotech Applications (ISAAA)** • Website: ISAAA • ISAAA is a global organization that provides information on biotechnology applications in

	agriculture, including biotech crop statistics and publications. 3. **The World of Genetically Modified Organisms (GMOs) - BIO** • Website: GMO Answers • GMO Answers, by the Biotechnology Innovation Organization (BIO), offers information on genetically modified organisms (GMOs) in agriculture, addressing common questions and concerns. 4. **FAO Biotechnology Forum** • Website: FAO Biotechnology Forum • The Food and Agriculture Organization (FAO) Biotechnology Forum provides information on the use of biotechnology in agriculture, including discussions, documents, and expert opinions. 5. **Genetic Literacy Project** • Website: Genetic Literacy Project • The Genetic Literacy Project provides articles and resources on genetics, biotechnology, and related topics, aiming to promote scientific literacy. 6. **AgBioForum** • Website: AgBioForum • AgBioForum is an international, peer-reviewed journal that publishes research on the economic, social, and environmental aspects of Environmental biotechnology. 7. **BioTech Primer** • Website: BioTech Primer • BioTech Primer offers online courses and resources covering various biotechnology topics, including those related to agriculture. 8. **United States Department of Agriculture (USDA) Biotechnology Resources** • Website: USDA Biotechnology • The USDA provides resources on biotechnology, including regulations, policies, and information on biotech crops.
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom**
Technology equipment (Projector, smart board, software)	**Projector, smart board**
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

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

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

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

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA

2024

TP-153

Course Specification

(Bachelor)

Course Title:	Environmental Microbiology
Course Code:	EVS 1242
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 (2 Lecture + 2 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 4/ 2nd Year)					
4. Course general Description:					

This course will introduce students to the field of environmental microbiology, which is the study of microbes in natural environments such as soil, water and air. Environmental Microbiology introduces students to the fascinating world of microorganisms, highlighting their evolution, importance, and functionality in the most varied environments. In this course, students learn of the vital role of microbes in marine and terrestrial ecosystems by exploring the dynamic interactions that take place between microbial communities, the surroundings, and higher organisms. Students will learn about microbial abundance and diversity in common habitats and in peculiar niches under extreme environmental conditions. During the course, we will explore the importance of microorganisms in soil formation and quality, in food production and plant health, in nutrient cycling and biodegradation of varied substrates and pollutants, in medicine and industry, in space exploration, and in bioremediation of contaminated soils. In this course, students will also learn how microorganisms can communicate with each other using signaling molecules, and how their genetic potential can be used for the advance of biotechnological processes. Furthermore, students will learn how to perform scientific experiments for monitoring, quantification, and qualification of microorganisms associated with plants, soil, and water, and how to use DNA sequences for identifying species and their function. This course will provide students with the ability to demonstrate their knowledge of prokaryotic biodiversity and function, and to apply this understanding to solve problems and find solutions related to current environmental issues that threaten planetary and human health (i.e.: antibiotic resistance, pollution, greenhouse gas emission, and global warming).

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

EVS 1111

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

None

7. Course Main Objective(s):

The objective of this course is to provide a basic understanding of environmental microbiology including; the functional diversity of microorganisms in the environment in relation to human welfare and ecosystem health, microbial interactions with pollutants in the environment and the fate of microbial pathogens in the environment. Special emphasis will be placed on how the activities and interactions of microorganisms influence biological systems ranging from humans to the planet as a whole. The course covers key themes in contemporary environmental microbiology including microbial diversity and function, adaptation to extreme environments, and biogeochemical cycling. Students will gain theoretical and practical experience in the latest cutting-edge techniques used to study microbial ecosystem function. Laboratory sessions allow students to gain experience in experimental design and practical research skills in the context of mini-research projects involving environmental issues. This course emphasizes how the principles and techniques of environmental microbiology can be applied to a range of environmental problems, and lead to the development of sustainable resources and commercial 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)**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	State the fundamental concepts and methodology of environmental microbiology.	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	Outline the diversity and distribution of microbes in several different environments, including water, sediments, soil and air.	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	Tell how plants, soil, and human microbiomes are interconnected and how they can influence each other.	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.4	Recognize the importance of microbial communities to the functioning of diverse ecosystems.	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.5	Describe microbial metabolism, genetics, growth and function in an environmental context.	K4	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Summarize methods commonly used in environmental microbiology and explain their limitations.	S1	Laboratory and take-home research assignment	Lab reports and Lab exam
2.2	Demonstrate how microbial diversity is assessed in diverse ecosystems.	S2	Laboratory and take-home research assignment	Lab reports and Lab exam
2.3	Compare and evaluate microbial communities by employing a variety of laboratory techniques, including isolation, enumeration, basic genome analysis and functional assays.	S3	Laboratory and take-home research assignment	Lab reports and Lab exam
2.4	Predict changes in microbial community structure according changes in biotic and abiotic factors.	S3	Laboratory and take-home research assignment	Lab reports and Lab exam
2.5	Use knowledge in environmental microbiology and ecosystems management to find out solutions for environmental issues.	S4	Laboratory and take-home research assignment	Lab reports and Lab exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Analyze and criticize primary literature articles in the field of environmental microbiology, extract essential information, interpret figures, and summarize key points, to improve critical thinking and evaluation skills.	V1	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.2	Communicate environmental microbiology-related information to various audiences in an accurate, compelling, and logically supported manner, via writing, talks and posters.	V2	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.3	Discuss specific problems using scientific evidence to support their position to an audience of peers.	V3	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	Introduction to Environmental Microbiology A. Environmental Microbiology as a Discipline. B. Microbial Influences on our Daily Lives.	4
2.	Microorganisms Found in the Environment A. Classification of Organisms. B. Prokaryotes. C. Eukaryotes. D. Viruses. E. Other Biological Entities.	4
3.	Earth Environments A. Earth's Living Skin. B. Physiochemical Characteristics of the Earth Environment. C. Soil as a Microbial Environment. D. Microorganisms in Surface Soils. E. Distribution of Microorganisms in Soil. F. Microorganisms in Subsurface Environments.	4
4.	Aeromicrobiology A. Aerosols. B. Nature of Bioaerosols. C. Aeromicrobiology Pathway. D. Microbial Survival in the Air. E. Extramural Aeromicrobiology. F. Intramural Microbiology.	2
5.	Aquatic Environments A. Microbial Habitats in the Aquatic Environment. B. Microbial Lifestyles in Aquatic Environments. C. Marine Environments. D. Freshwater Environments. E. Other Notable Aquatic Environments.	2
6.	Extreme Environments A. Low Temperature Environments. B. High Temperature Environments. C. Desiccation and UV Stress. D. Aphotic Environments Based on Chemolithoautotrophy.	2

7.	Environmental Sample Collection and Processing A. Soils and Sediments. B. Water. C. Air. D. Detection of Microorganisms on Fomites.	**2**
8.	Cultural Methods A. Extraction and Isolation Techniques. B. Plating Methods. C. Culture Media for Bacteria. D. Culture Methods for Algae and Cyanobacteria. E. Cell Culture-Based Methods for Viruses. Physiological Methods A. Measuring Microbial Activity in Pure Culture. B. Choosing the Appropriate Activity Measurement for Environmental Samples. C. Carbon Respiration. D. Incorporation of Radiolabeled Tracers into Cellular Macromolecules. E. Adenylate Energy Charge. F. Enzyme Assays. Immunological Methods A. What is an Antibody? B. Immunoassays. C. Immunosensors. Nucleic Acid-Based Methods A. Structure and Complementarity of Nucleic Acids. B. Obtaining Microbial Nucleic Acids from the Environment. C. Hybridization-Based Assays. D. Amplification-Based Assays. E. DNA Fingerprinting. F. Recombinant DNA Techniques. G. Sequence Analysis.	**2**
9.	Biogeochemical Cycling A. Carbon Cycle. B. Nitrogen Cycle. C. Sulfur Cycle. D. Iron Cycle.	**2**
10.	Microorganisms and Organic Pollutants A. The Overall Process of Biodegradation. B. Contaminant Structure, Toxicity, and Biodegradability.	**2**

	C. Environmental Factors Affecting Biodegradation. D. Biodegradation of Organic Pollutants. E. Bioremediation. Microorganisms and Metal Pollutants A. Metals in the Environment. B. Metal Solubility, Bioavailability, and Speciation. C. Metal Effects on the Microbial Cell. D. Mechanisms of Microbial Metal Resistance and Detoxification. E. Microbial Metal Transformations. F. Microbial Approaches in the Remediation of Metal-Contaminated Environments.	
11.	Microbial Diversity and Interactions in Natural Ecosystems A. Microbial Diversity in Natural Systems. B. Microbial Interactions. C. Microbial Diversity and Natural Products.	2
12.	Indicator Microorganisms A. Total Coliforms. B. Fecal Coliforms and Escherichia coli. C. Fecal Enterococci. D. Clostridium perfringes. E. Bacteroides and Bifidobacterium. F. Heterotrophic Plate Count. G. Bacteriophages.	2
Total		**30**

No	List of Topics (Lab)	Contact Hours
1.	Laboratory operations, safety, and reporting techniques	4
2.	Aseptic techniques	4
3.	Soil Microbiology	4
4.	Aeromicrobiology	2
5.	Aquatic microbiology	2
6.	Isolation of environmental microbes from soil, water and air (sampling, collecting, culturing)	2
7.	Enumeration of environmental microbes from soil, water and air (microscopy: (light, fluorescence, transmission electron, scanning electron)	2
8.	Identification of environmental microbes from soil, water and air: A. Physiological methods (measuring microbial activity, carbon respiration, radiolabeled tracers, enzyme assays, stable isotopes)	2

9.	Identification of environmental microbes from soil, water and air: B. Immunological methods (fluorescent immunolabeling, enzyme-linked immunosorbent assay, western immunoblotting)	2
10.	Identification of environmental microbes from soil, water and air: C. Nucleic acid-based methods (obtaining nucleic acids, hybridization, amplification, fingerprinting, recombinant DNA and sequence analysis)	2
11.	Determination of environmental microbial function (analysis of carbon metabolism, enzyme assays)	2
12.	Biodegradation and Bioremediation	2
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, 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	Jean-Claude Bertrand, Pierre Caumette, Philippe Lebaron, Robert Matheron, Philippe Normand, Télesphore Sime-Ngando. (2015) Environmental Microbiology: Fundamentals and Applications, 1st Edition, Springer Nature Ralph Mitchell, Ji-Dong Gu. (2010) Environmental Microbiology, 2nd edition, Wiley Raina M. Maier, Ian L. Pepper and Charles P. Gerba. (2009) Environmental Microbiology, 2nd edition, Elsevier

Supportive References	Marylynn V. Yates, Cindy H. Nakatsu, Robert V. Miller, Suresh D. Pillai. (2016) Manual of Environmental Microbiology, 4th Edition, Wiley
Electronic Materials	None
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 Smart board
Other equipment (depending on the nature of the specialty)	Environmental Microbiology-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 Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

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

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

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NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Fresh and Marine Water Algae
Course Code:	EVS 1244
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 (2 Lecture + 2 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 4 / Second Year)					
4. Course general Description:					
The course is designed to study marine and freshwater algae genera, their phenotypic characteristics, reproduction. The systematic position of each division, the relationship between the algae and other organisms, the distribution of algae in different environments (snow, lake, river, pond freshwater, semi-saline water, the sea, the ocean). Benthic algae and plankton and chemical, natural and biological factors that influence their distribution and proliferation. Harmful algal species as well as the economically important species in industrial, medical, and agricultural fields. Practical Section: include the following topics: - Isolation, purification, identification and preservation of ubiquitous algal genera in Saudi environment (i.e terrestrial , fresh and marine species).					
5. Pre-requirements for this course (if any)**:**					
EVS 1214 Marine and Fresh Water Processes					
None					
7. Course Main Objective(s):					
Upon successful completion of this course, the student must be able to: 1- **To outline the fundamental methods of identification, classification, and differentiation of algal groups and their life cycles according to the scientific systems.** 2- **To define and describe different algae genera, their distribution, and classification.** 3- **To clarify the biotic and abiotic factors affecting algae growth & distribution.** 4- **To demonstrate methods of algae isolation, purification, and identification from their habitats.** 5- **To recognize the environmental and economic impacts of algae.**					

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	-	-
5	**Other**	-	-

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 Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	State the fundamental concepts and methodology of Phycology.	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	State the types of algal division and the scope and its function within the Environment.	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Define the diversity, characteristics, economic importance, and classification of main groups of algae	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	**Skills**			
2.1	Compare different structures, characteristics, and the life cycle of algae.	S1	Laboratory and take-home research assignment	Lab reports & activity and Lab exam
2.2	Perform different experiments to examine and identify different types of algae safely and effectively.	**S2**	Laboratory and take-home research assignment	Lab reports & activity and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Show ability to work in a team to conduct a specific project and solve problems.	V1	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.2	Demonstrate ability to monitor and examine different kinds of algal species, their growth and interaction with the environment.	V2	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	- The relationship between the algae and other organisms. - The distribution of algae in different environments.	4
2.	- Chemical, natural and biological factors affecting growth and distribution of algae. -Benthic algae and plankton -Methods of reproduction in algae.	4
3.	Classification of algae Division: Cyanobacteria (blue-green algae)	4
4.	Division: Chlorophyta	4
5.	Division: Bacillariophyta	4
6.	Division: Euglenophyta Division : Charophyta,	2
7.	Division: Chrysophyta	2
8.	Division: Phaeophyta	2
9.	Division: Rhodophyta	2
10.	The economic and biotechnological importance of algae in agricultural, medical and industrial field.	2
	Total	**30**

No	List of Topics (labs)	Contact Hours
1.	Introduction to algae structure, function and classification	2
2.	Experimenting with the Cyanophyta growth, reproduction, and phenotypic examination	4
3.	Experimenting with Chlorophyta (i.e. species types , reproduction and phenotypic examination)	4
4.	Experiment with the Euglenophyta (i.e. species types , reproduction and phenotypic examination)	4
5.	Experimenting with the Chrysophyta (i.e. species types , reproduction and phenotypic examination)	4
6.	Experimenting with the Bacillariophyta (i.e. species types , reproduction and phenotypic examination)	4
7.	Experimenting with the Phaeophyta (i.e. species types , reproduction and phenotypic examination)	4
8.	Experimenting with the Rhodophyta (i.e. species types , reproduction and phenotypic examination)	4
	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, 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 Textbooks	• **Title:** "Algal Biology: A Comprehensive Guide" ○ **Author:** Linda E. Graham, Lee W. Wilcox, and Aaron J. Hehman ○ **Year:** 2023 • **Title:** "Algal Ecology: Freshwater Benthic Ecosystems" ○ **Author:** Edited by Brian A. Whitton, Michael F. Buchheim, John D. Wehr ○ **Year:** 2022 • **Title:** "Microalgal Biotechnology: Potential and Production" ○ **Author:** Eduardo Jacob-Lopes, Leila Queiroz Zepka, and Maria Isabel Queiroz ○ **Year:** 2021 • **Title:** "Phycology: Fourth Edition" ○ **Author:** Robert Edward Lee ○ **Year:** 2020 • **Title:** "Algae-Based Biopharmaceuticals" ○ **Author:** Hesham Ali El-Enshasy and Se-Kwon Kim ○ **Year:** 2020

Essential References Materials	- **Journal of Phycology** - This is a premier journal for phycological research, covering a wide range of topics related to algae. - **Phycologia** - Another leading journal in the field of phycology, offering research articles, reviews, and discussions on various aspects of algae. - **Algal Research** - A multidisciplinary journal focusing on algal research, including topics like cultivation, biotechnology, ecology, and applications. - **Journal of Applied Phycology** - This journal highlights applied research in the field of algae, including its role in biotechnology, environmental science, and more. - **Aquatic Botany** - A journal that publishes research on aquatic plants, including algae, in various aquatic ecosystems. - **Marine Biology** - While not exclusively focused on algae, this journal often features research on marine algae and their interactions with marine environments. - **Journal of Algal Biomass Utilization** - This journal emphasizes the utilization of algae for bioenergy, bioproducts, and environmental applications. - **Phycolgia Balcanica** - Focusing on algae in the Balkan region, this journal provides insights into algal diversity and ecology in this specific geographical area. - **Harmful Algae** - This journal is dedicated to the study of harmful algal blooms and their ecological, health, and economic impacts. - **Journal of Eukaryotic Microbiology** - While not algae-specific, it covers a wide range of topics related to protists, including various algal groups.
Electronic Materials	• http://zendahscience.jeeran.com/ • http://algae.sourceforge.net/algae.html • http://algae.sourceforge.net/ • http://www.algaebase.org/ • http://en.wikipedia.org/wiki/Algae • http://www.kingdomplantae.net/
Other Learning Materials	Videos, slides and presentations that are available with the instructor. Scientific video in http://www.youtube.com/ related to course contents

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 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 Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

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

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Principles of Ecotoxicology
Course Code:	EVS 1246
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 4, 2nd Year)					

4. Course General Description:

Ecotoxicology is an interdisciplinary field that draws from knowledge and techniques in the fields of ecology and toxicology to study the effects of toxic chemical or biological agents on biological organisms at the population, community or ecosystem level. Human activities significantly influence the natural environment, the BSc Environmental Resource Management will provide students with an in-depth understanding of what the implications of such activities on the environment are and what mitigation measures are needed to reduce such influences. Like any long-term strategy, understanding and safeguarding the environment requires a holistic perspective; since safeguarding one aspect today might have ripple effects on other factors eventually. The program is characterized by several modules that will allow students to develop technical solutions needed to solve, attenuate or control environmental issues. Specialized modules include Renewable Energy and Green Technologies, which aims to evaluate the technical, economic, and political aspects of renewable energy, as well as evaluate the successes and failures of implementing alternative energies at the local, national, and regional levels. Ecotoxicology aims to assess the effects of different classes of pollutants on individual organisms and species in food webs, enabling students to predict the negative implications on entire populations, ecosystems and on animals and human food resources.

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):

In general, the course aims to:

1. Describe the main aims of sampling, surveying and monitoring for different environmental systems.

2. Evaluate the different techniques used in environmental analysis.

3. Understand different analytical techniques in relationship to the various classes of pollutants.

4. Apply and appraise different in-situ and ex-situ techniques to collect environmental data.

5. Review different data analysis techniques used in the interpretation of field data.

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	Discuss the background in natural resource management, environmental quality, and analysis.	K1	Three credits hours weekly lectures, lab and field	-Quizzes -Presentations -Assignments -written exams
1.2	Outline the computational tools for spatial analysis, together with data management, statistics and modelling which have become essential tools in the environmental field.	K2	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.3	Identify the research methods that help practitioners innovation	K2	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.4	Clarify the theoretical background that govern environmental, energy and sustainability issues.	K3	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.5	Explain how interactions between organisms and their environments drive the dynamics at different biological levels and how human activities can influence interactions.	K4	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Relate the basic principles of toxicology to the applicable lab methods	S1	Three credits hours weekly lectures, lab and field Tutorials	-Presentations -Assignments -written exams
2.2	Interpret the mechanisms underlying the uptake, metabolism, elimination and effects in humans and animals.	S1	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Assignments -written exams
2.3	Evaluate the toxicological impacts at the species, population, community and ecosystem levels.	S2	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Reports
2.4	Apply the ecotoxicological tests in different environmental scenarios.	S3	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Reports
2.5	Perform research work based on the general principles of environmental risk assessment of chemicals.	S4	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Reports
3.0	**Values, autonomy, and responsibility**			
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 discussion of scientific issues professionally, and present research data effectively through different modes and for varied audiences.	V2	Group discussions	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
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 ecotoxicology.**	4
2.	Integrating Ecology and Toxicology	4
3.	Individual Variation and Life History traits	4
4.	Population demographic models and theory	2
5.	Multiple stressors, trait based approaches to community ecotox	4
6.	Indirect effect case studies	2
7.	Macroecology and ecosystem approaches	2
8.	Contaminant-induced evolutionary change	4
9	Communication and Reporting Writing Research Reports Presenting Findings and Data Peer Review and field trips	4
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, 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	1- Principles of Ecotoxicology, Third Edition by C. H. Walker, S. P. Hopkin, R. M. Sibly, D. B. Peakall, CRC Press Taylor & Francis Group, Boca Raton, FL, 2006, 33487–2742, ISBN 10:084933635X Fourth Edition.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
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	Faculty	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	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/2/1446H**

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Education & Training Evaluation Commission

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2024

TP-154

Course Report

(Bachelor)

Course Title: **Field Training**
Course Code: **EVS 1292 (Exit-Point Training) EVS-1493 (Major Field Training)**
Program: **Bachelor of Science in Environmental Science**
Department: **Biology**
College: **Science**
Institution: **Imam Mohammad Ibn Saud Islamic University**
Field Experience Version Number: **2023 – V1**
Last Revision Date: **None**

Table of Contents

A. Field Experience Details:

1. Credit hours:		
4		
2. Level/year at which Field Experience is offered:		
EVS 1292 (Level 4 / Year 2)	EVS 1493 (Level 8 / Year 4)	
3. Time allocated for Field Experience activities:		
(15) Weeks	(45) Days	(180) Hours
4. Corequisite (or prerequisites if any) to join Field Experience:		
Student must complete at least 160 credit hours of the study program. Exit point diploma requires 50% of the total credit hours		
5. Mode of delivery:		
☒ In-person/onsite	☐hybrid (onsite/online)	☐Online

B. Field Experience Course Learning Outcomes (CLOs), Training Activities and Assessment Methods

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
1.0	Knowledge and understanding				
1.1	**Recall knowledge of the context of the professional career before graduation.**	**K1, K2**	**Participation with the field supervisor at workplace.**	**Direct:** **Discussion Specific rubric**	**Field Supervisor**
1.2	**Explain professional interests in related fields of Biology.**	**K1, K2**	**Subject-based study essays written-short answer/long answer/report**	**Direct:** **Rubric of evaluation**	**Field Supervisor**
1.3	**Identify a range of opportunities for learning, development and monitoring throughout the duration of the training.**	**K3, K4**	**Oral test** **Presentation** **Written report**	**Direct:** **Evaluate student's Discussion**	**Field Supervisor**
2.0	Skills				
2.1	**Apply what has been learned in classroom to real-world situations.**	**S1, S3**	**workplace performance.** **Oral Presentations**	**Direct:** **Portfolio** **Student's diary/journal.**	**Field Supervisor** **Student** **Teaching staff**
2.2	**Create critical thinking and innovative problem-solving skills with confidence and rigor.**	**S1, S2**	**Written research questions/ Reflection**	**Direct:** **Student portfolio**	**Field Supervisor**

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
2.3	Communicate oral and written information in a manner that reflects professional social work skills.	S2, S3	Written tasks Discussion	Direct: Evaluation of Report and mails.	Field Supervisor Teaching staff
2.4	Monitor the various pressures that he/she may face in the labor market.	S2, S3	Participation with the field supervisor at workplace	Direct: Direct observation	Field Supervisor
2.5	Construct with other professionals.	S3, S4	Participation with the field supervisor at workplace	Direct: Direct observation	Field Supervisor Teaching staff
3.0	Values, autonomy, and responsibility				
3.1	Develop discipline, with the capacity to undertake lifelong learning, self and social responsibility.	V1, V2	Discussion, behavior	Direct: Portfolio and direct observation	Field Supervisor
3.2	Make ethic principles of the profession in practice.	V4	Discussion, behavior	Direct: Direct observation portfolio	Field Supervisor
3.3	Generate integrity and honesty.	V1, V3	Discussion, behavior	Direct: Direct observation	Field Supervisor

*Assessment methods (i.e., practical test, field report, oral test, presentation, group project, essay, etc.).

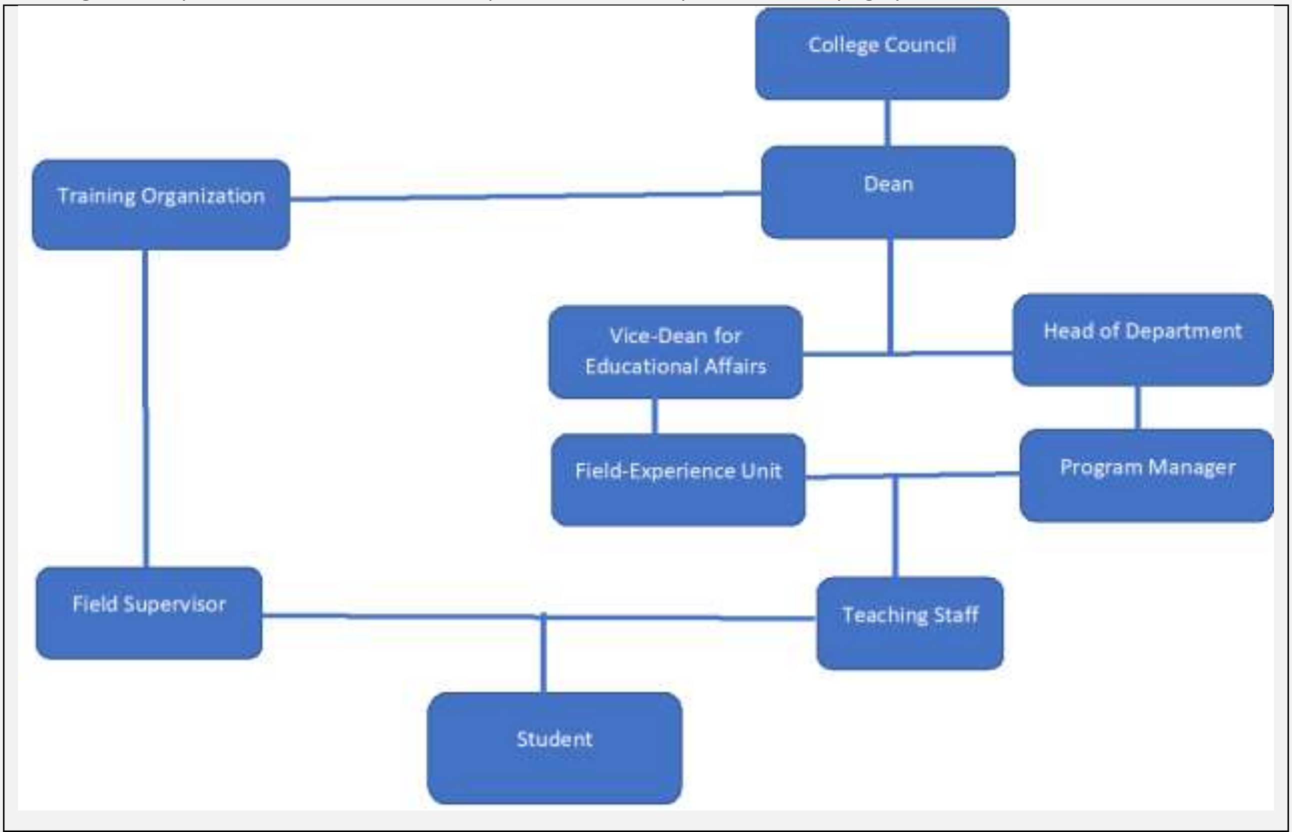
** Field training (Exit-Point) EVS-1292 involves K1, K2, S1, S2, V1. V2 learning outcomes domains.

*** Field training (Major) involves all learning outcomes domains.

C. Field Experience Administration

1. Field Experience Flowchart for Responsibility

Including units, departments, and committees responsible for field experience identifying by the interrelations.



2. Distribution of Responsibilities for Field Experience Activities

Activities	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Selection of a field experience site	✓		✓		
Selection of supervisory staff	✓			✓	
Provision of the required equipment				✓	✓
Provision of learning resources				✓	✓
Ensuring the safety of the site				✓	
Commuting to and from the field experience site		✓	✓		✓
Provision of support and guidance		✓			✓
Implementation of training activities (duties, reports, projects .)		✓			✓

Activities	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Follow up on student training activities		✓			✓
Monitoring attendance and leave		✓			✓
Assessment of learning outcomes		✓		✓	✓
Evaluating the quality of field experience	✓	✓	✓	✓	✓
Others (specify)					

3. Field Experience Location Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
Banks	**IT, appropriate Software for actuarial and financial analysis**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students.** • **Awareness of Ethical Code of Conduct.**
Maaden	**IT, Modeling and Simulation software, Techno-Laboratories**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students.** • **Awareness of Ethical Code of Conduct.**
Saudi Aramco	**IT, Modeling and Simulation software, Techno-Laboratories**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students.** • **Awareness of Ethical Code of Conduct.**
KACST	**IT, Modeling and Simulation software, Techno-Laboratories, office equipment**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students.** • **Awareness of Ethical Code of Conduct.**
The Zakat, Tax and Customs Authority (ZATCA)	**IT, Statistical Software, office equipment**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students.** • **Awareness of Ethical Code of Conduct.**

Suggested Field Experience Locations	General Requirements*	Special Requirements**
General Authority for Statistics	**IT, Statistical Software**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students.** • **Awareness of Ethical Code of Conduct.**
Public School	**Learning and teaching resources**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students. Awareness of Ethical Code of Conduct.**
Private Schools	**The workplace must be registered and approved by the competent Saudi instances.** **Legal status as determined by the law in Saudi Arabia.** **Learning and teaching resources.**	• **The field experience location activities must be appropriate and consistent with the mission of IMSUI and the requirements for field training learning outcomes** • **Safe environment for both male and female students.** • **Awareness of Ethical Code of Conduct.**

*E.g. provides information technology, equipment, laboratories, halls, housing, learning sources, clinics … etc.
** E.g. Criteria of the institution offering the training or those related to the specialization, such as safety standards, dealing with patients in medical specialties … etc.

4. Decision-Making Procedures for Identifying Appropriate Locations for Field Experience

Before starting the process for field training, the college should state a range of partnerships with potential training organizations that may provide high-level training opportunities.

The list of partnerships should be available in website of college of science.

These partnerships should be based on requirements listed above.

The college should communicate the present document (including qualifications and responsibilities) to the training organization to: ensure skills requirements and determine an appropriate field supervisor.

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
Potential Risks depend on the workspace and production activities of the training organization.	Basic safety rules and tips that need to be followed at the worksite.	Respecting the last updated version of the booklet “Implementation of Risk Management and Safety Culture” published by The Ministry of Labor and Social development.

Potential sources of harm and hazards should be identified. This issue should be discussed with Training Organization before starting the training	Safety guidelines must be established and maintained: safety procedures for laboratory investigations and field trips should be implemented.	• providing an understanding of how to deal with different types of work-training to help reduce exposure risks. • Offering short risk management training at the beginning of training.

D. Training Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student performance, effectiveness, and efficiency	Field Supervisor	Direct and Indirect
Quality of learning resources Effectiveness of Training and assessment.	Teaching staff	Indirect
Student performance	Teaching staff, Program manager	Indirect
Evaluation of the field Experience (workspace, Quality of learning resources, supervisory, achievements, skills, behavior, time)	Teaching staff, Program Manager	Indirect

Evaluation areas (e.g., Effectiveness of Training and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Supervisory Staff, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

E. Specification Approval Data

Council / Committee	**Biology Department Council**
Reference No.	**2**
Date	**21/2/1446H**

Course Report

(Bachelor)

Course Title:	Green Infrastructure Technologies
Course Code:	EVS1350
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: 2 (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 4 / 2nd Year)					
4. Course General Description:					
This course introduces the students to the concepts of green infrastructure and the implementation of renewable technologies. It also provides an overview of how green infrastructure systems work, the benefits they can provide, and how they can be employed effectively. The course outlines a comprehensive overview of the current and growing green infrastructure theory, design, and practice, and the associated challenges and opportunities.					
5. Pre-requirements for this course (if any):					
EVS 1110 Fundamentals of Environmental Science EVS1116 Foundation of Sustainable Development					
None					
7. Course Main Objective(s):					
1. Define and describe green infrastructure. 2. Identify the key processes and elements of green infrastructure that address some environmental issues. 3. Identify sites where green infrastructure has been (or is planned to be) employed and some of the best practices of its technologies. 4. Understand the process of green infrastructure design and be able to apply some of them to complete a design to capture and retain stormwater.					

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)** (Green Design Project)	30
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the idea of Green Infrastructure Technologies and its benefits.	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	Explain various Elements of Green infrastructure systems interdependence.	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Outline the types, elements, roles, functions and green infrastructure technologies and associated design applications.	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	**Skills**			
2.1	Analyze and Investigate green infrastructure technologies that address site, environmental, function and management considerations.	S1	take-home research assignment	activity and exam
2.2	Design a green infrastructure installation that performs multiple functions, including the provision of relevant ecosystem services.	S2	take-home research assignment	activity and exam
2.3	Use computers and internet to analyze the green-infrastructure interdependence.	S3	take-home research assignment	activity and exam
3.0	**Values, autonomy, and responsibility**			
3.1	Show independence in performing the assigned work and cooperate	V1	Group discussions	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	effectively with the members of the research teams.			
3.2	Share in the discussions of scientific issues and communicate the data effectively via verbal and non-verbal presentations (both oral and written formats)	V2	Group discussions	-Presentations -Reports
3.3	Adhere to the relevant ethics while performing a field or research work	V3	Group discussions	-Presentations -Reports

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	- Introduction: What is Green infrastructure? Consumerism – Barriers to "Going Green". Ch. 1 Benedict	4
2.	- Green infrastructure past and present Green Buildings LEED Certification. Ch.2 Benedict	4
3.	- Benefits-Weighing: the Pros and Cons New and Emerging Technologies. Ch.3 Benedict	4
4.	- Where do we begin? The Basics of Network Design Greening Business & Industry. Ch.4, 5 Benedict	3
5.	Matching Resources to Needs The Greening of IT. Ch. 6 Benedict	3
6.	Incentives and Economics of "Going Green".	4
7.	Management and Stewardship Green Partnerships. Ch. 7 Benedict	4
8.	Building Support and Making it happen Looking to the Future. Ch. 8, 9 Benedict	4
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.	Green infrastructure project	During the semester	30%
4.	Final Exam	Around 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	Textbook: Benedict, Mark and McMahon, Edward T. (2006). Green Infrastructure: Linking Landscapes and Communities. Washington: Island Press.
Supportive References	
Electronic Materials	• Saudi Digital Library https://www.sdl.edu.sa/SDLPortal/Publishers.aspx
Other Learning Materials	Videos, slides and presentations

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 speciality)	

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**

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

Course Specification
(Bachelor)

Course Title:	Sustainable Fisheries and Aquaculture
Course Code:	EVS 1352
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 5/ 3rd Year)					
4. Course general Description:					
Wild-captured fisheries and aquaculture are the biggest protein sources globally, providing more than 3 billion individuals essential nutrition. This protein is sourced from fish, elasmobranchs, crustaceans, molluscs, and algae harvested by commercial, recreational, and Indigenous fisheries and cultivated through aquaculture practices. This course examines the key aspects that impact the spread and number of specific species, crucial for comprehending their use in fishing practices. These factors consist of an evaluation of the life cycle phases, demographic composition, habitat preferences, and feeding interactions of the specified species. This data, in addition to farming techniques, is vital for the success of aquaculture operations. Students will examine methods utilized in fisheries science and analyze human activities' effects on managing wild-harvest fisheries. The discussion will focus on emerging trends such as transitioning from wild-harvest extraction to aquaculture production and more comprehensive ecosystem management. The program includes interactive learning sessions, labs for both wet and computer work, field trips, and workshops. The field study and off-University workshop will occur during the mid-trimester break. After the course, students will have the essential skills needed to get ready for careers in coastal-focused research and industry.					
5. Pre-requirements for this course (if any)**:**					
EVS 1111					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
By taking a Sustainable Fisheries and Aquaculture course, students can help promote the sustainable harvesting and production of fish and shellfish, as well as the evaluation and control of human influence and environmental changes. They can also engage in pioneering research on aquatic ecosystems, the characteristics					

of their inhabitants, and how they affect the world's climate. This course is centered on the responsible use of the aquatic environment and its resources, as well as the promotion of sustainable aquaculture production.
The focus is on fisheries, oceanography, and the administration of aquatic resources, tackling the issues linked to sustainable fisheries and aquaculture, and the preservation of healthy ecosystems amidst changing environments.

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 Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the main features of the biology of fisheries and aquaculture	**K1**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	State modern methods to gather, compile, and analyze ecological and biological data.	**K2**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	Explain how fishing and aquaculture are practiced.	**K3**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.4	Describe the management strategies applied to aquaculture and fisheries.	**K4**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	**Skills**			
2.1	Summarize methods commonly used in critically evaluating the life cycles of fish, crustaceans, molluscs, and algae and explain their limitations.	**S1**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.2	Formulate arguments concerning the effects of aquaculture and fishing.	**S2**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.3	Use focused exercises, online discussions, and digital presentations to communicate scientific information to the audience effectively.	**S3**	Laboratory and take-home research assignment	Lab reports and Lab exam
2.4	Employ knowledge in ecosystem management to find solutions for environmental issues related to fisheries practices and aquaculture.	**S4**	Laboratory and take-home research assignment	Lab reports and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate the ability to work independently and cooperate in teamwork.	**V1**	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Show the ability to communicate fisheries-related information 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 exam, Lab reports, project presentations, Lab exam and final exam
3.3	Share in the discussion of literature articles in the field of aquaculture, and argue specific problems using scientific evidence.	**V3**	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Introduction to Fisheries and Aquaculture: - Nutritional Value of Fish and Its Impact on Human Health - Growing Importance of Fish Availability and Demand in local and Global Food Systems - Marine ecosystems and climate change - Fisheries and Aquaculture: Income Generation, Livelihood Security, and Contributions to Food Security - Opportunities and challenges in aquaculture for food security	**4**
2.	Fisheries and Aquaculture in Saudi Arabia - The Size and Composition of Local Marine Fisheries - Characterization of Local Aquaculture Practices - Types and volume of imports of fishing and aquaculture products - Alignment of the Kingdom's Fisheries and Aquaculture Strategies with Saudi Vision 2030 - Regulated Fish Species and Establishment of Marine Protected Areas in the Kingdom - Challenges and Opportunities in Local Fisheries and Aquaculture	**4**

3.	Terrestrial "inland" fish, shrimp aquaculture, from hatchery to harvest - Hatchery management, Egg Collection , Handling and fertilization, sex determination and controlling , disease prevention - Breeding, fish and shrimp nutrition , Automated Feeding Systems and Alternative Protein Sources, health management, transport and stocking. - Rearing, impact of pond design , depth, aeration system and light. - Harvesting , covenantal methods and Autonomous Underwater Vehicles and Precision Harvesting Systems	**4**
4.	Water quality in terrestrial aquaculture , Recirculating aquaculture systems and Remote Monitoring Systems	**4**
5.	Aquaponics and Biofloc systems	**2**
6.	Marine Aquaculture	**2**
7.	algal culturing	**2**
8.	Genetics for Aquatic Conservation: Fisheries and Biodiversity Management	**2**
9.	Precision Breeding**:** Gene editing techniques and CRISPR	**2**
10.	Fisheries systems – management and modeling and oceanography	**2**
11.	Recreational fishing; Biological impacts, management, and human dimensions	**2**
Total		**30**

No	List of Topics (labs)	Contact Hours
1.	Laboratory operations, safety, and reporting techniques	**8**
2.	Water quality tests in aquaculture, chemical analysis	**4**
3.	Water quality tests in aquaculture, microbial analysis	**4**
4.	Water quality tests in aquaculture, toxicity tests	**4**
5.	Diagnostic Methods for Nematode Infections in Fish Tissues	**4**
6.	Diagnostic Methods for bacterial Infections in Fish and shrimp	**4**
7.	Diagnostic Methods for Viral Infections in Fish and shrimp	**2**
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, 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	Ahmed, M. & Lorica, M.H. 2002. Improving developing country food security through aquaculture developmentlessons from Asia. Food Policy, 27(2): 125–141. Allen, R. 2010. International management of tuna fisheries: arrangements, challenges and a way forward. FAO Fisheries and Aquaculture Technical Paper. No. 536. Rome, FAO. 45 p Naylor, R.L., Goldburg, R.J., Primavera, J.H., Kautsky, N., Beveridge, M.C., Clay, J., Folke, C., Lubchenco, J., Mooney, H. & Troell, M. 2000. Effect of aquaculture on world fish supplies. Nature, 405(6790): 1017– 1024. Boyd, C.E., Tucker, C., McNevin, A., Bostock, K. & Clay, J. 2007. Indicators of resource use efficiency and environmental performance in fish and crustacean aquaculture. Reviews in Fisheries Science, 15: 327–360. Branch, T.A. 2008. Not all fisheries will be collapsed in 2048. Marine Policy, 32(1): 38–39. Dunham, R.A., Majumdar, K., Hallerman, E., Bartley, D., Mair, G., Hulata, G., Liu, Z., Pongthana, N., Bakos, J., Penman, D., Gupta, M., Rothlisberg, P. & Hoerstgen-Schwark, G. 2001. Review of the status of aquaculture genetics. In R.P. Subasinghe, P. Bueno, M.J. Phillips, C. Hough, S.E. McGladdery & J.R. Arthur, eds. Aquaculture in the Third Millennium, pp. 137–166. Technical Proceedings of the Conference on Aquaculture in the Third

	Millennium, Bangkok, Thailand, 20–25 February 2000. Rome, FAO, and Bangkok, NACA.
Supportive References	Serrano, P.M. 2005. Responsible use of antibiotics in aquaculture. FAO Fisheries Technical Paper. No. 465. Rome, FAO. 97p. Sharma, C. & Rajagopalan, R. 2013. Marine protected areas: securing tenure rights of fishing communities. Land Tenure Journal, 1. Muir, J. 1999. Aquaculture and poverty: full baskets or empty promises? Perspectives from DFID Aquaculture Research Programme. Paper presented at the Fifth Fisheries Development Donor Consultation, 22–24 February. Rome, FAO.
Electronic Materials	None
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 Smart board
Other equipment (depending on the nature of the specialty)	Fishing-related instruments

F. Assessment of Course Quality

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

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

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

Course Specification
(Bachelor)

Course Title:	Epigenetics
Course Code:	EVS 1356
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: 2 (Lecture 2 + 0+ 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (Level 5 / 3rd Year)					
4. Course General Description:					
This course is designed to introduce students into the rigorous foundation in epigenetics. It will emphasize various epigenetics process, how the epigenetic status of the genome forms and maintains, role of epigenetic processes in gene regulation, its involvement in disease development, and recent advances in assessing epigenetic changes of the genome. Based on the review of the seminal works in epigenetics field, this course will familiarize the student with current technology and driving principles of the field of epigenetics. The budding field of Ecological Epigenetics seeks to extend our knowledge of epigenetic mechanisms and processes to natural populations, and recent conceptual and technical advances have made progress toward this goal more feasible.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1112					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
The objective of this course is to identify the fundamental theoretical understanding of complex Epigenetic Phenomena as well as the state-of-the-art of the experimental approaches in current ecological Epigenetic. In particular, ecological epigenetics has the potential to explain how populations endure (or fail to endure) profound and rapid environmental change.					

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	**Explain how epigenetic inheritance from genetic inheritance and various methods to assess gene specific and genome wide epigenetic changes**	K1	Course lectures	Quiz Midterms Final Exam
1.2	**Outline the structure and organization of chromatin and how it plays a role in epigenetic regulation**	K2	Course lectures	Quiz Midterm Final Exam
2.0	Skills			
2.1	**Analyze the role of DNA methylation in epigenetic gene regulation**	S1	Course lectures	Quiz Midterm Final Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	**Relate between epigenetic changes and various disorders**	S2	Course lectures	Lab Midterm Final Exam
2.3	**Interpret epigenetic data**	S3	Course lectures	Midterm Final Exam
3.0	Values, autonomy, and responsibility			
3.1	**Demonstrate independence and ability to cooperate with a team**	V1	Discussion	Performance Evaluation
3.2	**Share in scientific activities and present data effectively**	V2	Discussion	Performance Evaluation

C. Course Content

No	List of Topics	Contact Hours
1.	**Fundamental principles about epigenetics:** - *Epigenetics as a new frontier in biology* - *Genetics to epigenetics* - *The Epigenome*	**4**
2.	**The mechanisms and molecules that regulate epigenetic processes** - *Chromatin modifications* - *DNA methylation and non-coding RNAs* - *Dynamic organization of the genome and epigenetic processes*	**4**
3.	**Epigenetic phenomena in different animal model organisms** - *X chromosome inactivation in Mammals* - *Transgenerational epigenetic inheritance in animals*	**4**
4.	**How can epigenetics influence the life of an organism?** - *Inheritance of chromatin modifications* - *Epigenetic reprogramming and genomic imprinting* - *Epigenetic and cell differentiation* - *Epigenetic variations in human populations*	**4**
5.	**Environmental epigenetics** - *nutrition drives heritable epigenetic changes* - *Epigenetic inheritance of environmental stresses* - *Epigenetic control of selfish elements during environmental changes*	**4**

6.	**Epigenetic mechanisms in diseases** - *Epigenetics and aging* - *Epigenetic mechanisms in metabolic diseases* - *Epigenetic in cancer* - *Therapeutic epigenetic approaches to cancer*	**8**
7.	**Future perspective** - *New frontiers of epigenetic research* -*Epigenetic discoveries for human society*	**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	20%
2.	Midterm 2	Around 7th - 8th week	20%
3.	Quizzes, Participation, Attendance, Presentations, Data search	During the semester	20%
4.	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	-Benjamin A Pierce (2020) Genetics: a conceptual approach. 7th edition W.H. Freeman. ISBN-13-978-1319216801.
Supportive References	
Electronic Materials	• Saudi Digital Library https://www.sdl.edu.sa/SDLPortal/Publishers.aspx http://www.animalbehavior.com
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 Smart board
Other equipment (depending on the nature of the specialty)	Environmental Epigenetics-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 Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

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

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

Course Specification
(Bachelor)

Course Title:	Environmental Impact Assessment
Course Code:	EVS 1354
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 (2 Lecture + 2 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 5/ 3rd Year)					
4. Course General Description:					
This course provides an introduction to Environmental Impact Assessment (EIA) as a critical tool for evaluating the potential environmental consequences of proposed projects, policies, or plans. Students will learn the principles, methodologies, and regulatory frameworks associated with EIA, as well as practical skills for conducting environmental assessments. Case studies and real-world examples will be used to illustrate the application of EIA in various contexts. Understand principles, processes, and necessary tools and techniques for environmental impact assessment, mitigation and monitoring. Evaluate the impacts of the project's activities on natural resources, ecological systems and community.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
After successful completion of this course, students will be able to: Understand the principles, methodologies, and regulatory frameworks associated with EIA, as well as practical skills for conducting environmental assessments, mitigation and monitoring. To provide practical skills for conducting different stages of EIA process, including scoping, impact prediction, mitigation, and monitoring. Evaluate impacts from project's activities on natural resources, ecological system and community. To analyze case studies and real-world examples to assess the					

effectiveness and challenges of EIA implementation. To promote critical thinking and ethical considerations in the practice of environmental assessment.

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**	4
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	Outline the principle of environmental impact assessment.	K1	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams
1.2	Recognise processes of environmental impact assessment.	K2	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams
1.3	Explain the key concepts, methods, and techniques used in the assessment of environmental impacts.	K3	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams
2.0	**Skills**			
2.1	Relate the theory of each resource dimension to the environmental impact assessment.	S1	Self-study is an important method for students' learning.	Questions in lectures. Short quizzes and exams.
2.2	Plan a research study in the field of environmental impact assessment	S2	Introduce some concepts by examples from real life problems (i.e., Laboratory).	Participation through class work and Homework.
2.3	Apply integrated knowledge to enhance skills on environmental impact assessment.	S3	Encourage students to communicate their biology thinking to ask and answer question when they arise. Motivate students to work cooperatively with their classmates to develop individual skills	Work portfolio.
2.4	Analyze case studies and real-world examples to assess	S4	Self-study is an important method for students' learning.	Questions in lectures. Short

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	the effectiveness and challenges of EIA implementation.			quizzes and exams.
3.0	**Values, autonomy, and responsibility**			
3.1	Show ability to work in a team to solve problem regarding environmental issues.	V1	Motivate students to ask questions and to give response to the teacher's questions.	Homework's, quizzes, exams and participation.
3.2	Share in specialized activities and present results of environmental impact assessment	V2	Encourage the students to be self-starters to finish the chemical problems properly. Writing laboratory reports.	Evaluating the laboratory written reports and calculation skills.
3.3	Demonstrate accountability in carrying out the assigned work	V3	Computer lab Presentations	Examinations, Laboratory performance and reports.

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction (Background of EIA, SEA, HIA).** The steps and EIA processes. Definition and objectives of EIA Historical development and significance Relationship with sustainability and environmental management	4
2.	**Legal and Regulatory Frameworks** Acts, laws, and regulations. Assessment of impact on ecosystem dimension (Terrestrial ecosystem). International conventions and agreements (e.g., Aarhus Convention, Kyoto Protocol) National and regional environmental laws and regulations Roles and responsibilities of stakeholders in the EIA process	4
3.	**Key Concepts and Methodologies** Screening and scoping Baseline studies and data collection Impact prediction and assessment techniques Cumulative and synergistic effects	4

4.	**Mitigation and Alternatives Analysis** Principles of impact mitigation and avoidance Evaluation of alternative project designs or locations Best practices for integrating mitigation measures into project planning	4
5.	Assessment of Quality-of-life dimension (health and socioeconomic). Public participation and public hearing in EIA process.	4
6	Assessment of impact on ecosystem dimension (Aquatic ecosystem). Assessment of impact on physical environmental dimension (soil and land use).	**4**
7	Assessment of impact on physical environmental dimension (water resource and air). Assessment of Quality-of-life dimension (health and socioeconomic).	**2**
8.	Mitigation and monitoring. Conclusion and students' presentation.	**2**
9.	Oral presentation.	**2**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	Around 5th -6th week	15%
2.	Midterm exam 2	Around 7th -8th week	15%
3.	Quizzes, Attendance, Participation, assignments		10%
4.	Lab reports	All the semester	5 %
5.	Final Lab Exam.	15th week	15%
6.	Final Exam.	16th week	40%
7.	**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	• Eccleston HC. Environmental Impact Statements. Canada: John Wiley & Sons, Inc.; (2000). ISBN13: 978-0471358688. • Lee N, George C, editors. Environmental Assessment in Developing and Transitional Countries - Principles, Methods & Practice. (2000). ISBN-13: 978-0471985570. • Wathern P. Environmental Impact Assessment: Theory and Practice. Routledge; 2013.

	• Glasson J, Therivel R, Chadwick A. Introduction to Environmental Impact Assessment. Routledge; 2012. • Eccleston CH. Environmental Impact Assessment: A Guide to Best Professional Practices. John Wiley & Sons; 2005. • Canter L. Principles of Environmental Impact Assessment. CRC Press; 1996.
Supportive References	http://www.kryeministri-ks.net/repository/docs/Final_EIA_Veterinary_Laboratory321.pdf. http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/Appendix%20B.pdf. • Environmental Protection Agency (EPA). Environmental Impact Assessment. Retrieved from https://www.epa.gov/environmental-assessments • International Association for Impact Assessment (IAIA). Introduction to Environmental Impact Assessment. Retrieved from https://www.iaia.org/what-is-impact-assessment • United Nations Environment Programme (UNEP). (n.d.). Environmental Impact Assessment Training Resource Manual. Retrieved from https://wedocs.unep.org/handle/20.500.11822/25491 • World Bank Group. (n.d.). Environmental Impact Assessment: A Guide to Best Professional Practices. Retrieved from https://www.worldbank.org/en/topic/environmentalassessment
Electronic Materials	https://books.google.com.sa/books?
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, laboratories
Technology equipment (projector, smart board, software)	Projector, smartboard
Other equipment (depending on the nature of the speciality)	-

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	Faculty	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**

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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

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

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

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NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Protected Areas
Course Code:	EVS 1362
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 (2 Lecture + 2 Lab)					
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 provides students with the essential knowledge related to the areas dedicated to nature conservation, also known as "protected areas." Protected areas cover more than 15% of global land mass and serve as a critical conservation tool for protecting nature and biodiversity. Effective conservation and management of this significant protected land is central to achieving global conservation and sustainable development goals. The knowledge, practical skills, and field training required by contemporary protected area conservation professionals are provided. The course contents explain why these areas are so important to the health of the environment in our fast-developing world. The students are introduced to the key concepts needed to understand protected area management and policy at the national and international levels. History, philosophy, laws, policies, and international conventions of the global protected area system are among the course key topics related to protected area management. The management planning, governance, management practice, ecological imperatives of protected areas and their sustainability are also covered to address complex conservation problems within protected areas. Terrestrial, freshwater and marine protected areas are addressed.

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

EVS 1110 EVS 1112

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

None

7. Course Main Objective(s):

The structure of the course ensures that students can acquire the required skills for protected area planning and management. The course is designed to provide the necessary foundation to pursue a future career in protected area management.
The main course objectives involve:
-Providing knowledge of contemporary issues relating to biodiversity conservation and the role of protected areas.
-Develop skills in analysing the relationship and values between protected areas, adjacent lands, neighbouring communities and the wider community.
-Identifying the relevant environmental, social and economic values attributed to protected areas.
-Enhancing the appreciation of the importance of biological diversity and the ecological services provided by the protected areas.
-Understanding the key approaches and considerations for the management of protected areas.
-Gaining knowledge of different approaches to the management of protected areas at global, national and local levels.

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**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**			
1.1	**Explain comprehensively the techniques and principles underpinning the design of effective and representative protected area networks.**	**K1**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data search
1.2	**Outline the principles and main processes of the government and management challenges of conservation.**	**K2**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data Search
1.3	**Describe the planning process for establishing protected areas**	**K3**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data Search
1.4	**Relate between protected areas and their impacts on community and biodiversity and clarify how the effectiveness of a protected area is assessed.**	**K4**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data Search

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	**Apply integrated conservation and development concepts and approaches to the management of protected areas.**	**S1**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data search
2.2	**Evaluate the concepts and purposes of protected areas as part of global conservation strategies.**	**S2**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data search
2.3	**Synthesise theories relevant to protected areas and wider conservation fields and apply data collection and analysis techniques to define problems and solutions.**	**S3**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data search
2.4	**Analyse the contemporary relationship between protected areas and adjacent lands and communities.**	**S3**	-Weekly lectures -Class discussions	-Written exam -Participation -Essay -Data search
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate independence and cooperate effectively with research team**	**V1**	-Group discussions	-Presentations -Reports -Seminars

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
3.2	**Share in specialized discussions and present scientific data via written format and oral presentations**	**V2**	-Group discussions	-Presentations -Reports -Seminars
3.3	**Adhere to ethical rules while performing activities in the field of protected areas.**	**V4**	-Group discussions	-Presentations -Reports -Seminars

C. Course Content

No	List of Topics	Contact Hours
1.	**Concepts of protected areas:** -Definitions of protected areas based on management categories and governance types -The history of protected areas -Importance of protected areas and protected area systems -Role and functions of protected areas -IUCN World Commission on Protected Areas -IUCN categories for protected areas -Convention on Biodiversity	**4**
2.	**Planning of protected areas:** -Integrated planning of a protected area and surrounding developed zones -Planning of a single protected area -Planning of a system of protected areas - Protected area networks - Representative ecological networks	**4**

3.	**Governance of protected areas:** -Private protected areas -Definition of governance -Governmental protected areas -Community-based protected areas -Shared governance	4
4.	**Monitoring and conservation of protected areas:** -Ecological monitoring and conservation -Monitoring of protected area management -Green List of protected areas -Management effectiveness and adaptive management -Law enforcement in protected areas -Education about conservation -World heritage convention -Convention on the Conservation of Migratory Species of Wild Animals	4
5.	**Specificities of protected area management:** -Culture and nature -Capacity-building for protected area management -Species approach -Convention on international trade in endangered species -Interactions between protected areas and resident and local communities.	4
6.	**Marine protected areas:** -Specifications of marine protected areas	2
7.	**Tourism in protected areas (ecotourism):** -Tourism forms in protected areas	2
8.	**Economics of protected areas:** -Economical values of protected areas -Sustainable funding	2

	-Financial planning -Funding sources and mechanisms	
9.	**Themes with protected areas:** -Ecological restoration -Connectivity and buffer zones -Natural resources trafficking	**2**
10.	**Protected areas and climate change:** -Impact of climate change on protected areas	**2**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Midterm exam 1**	Around 5^{th} and 6^{th} week	15%
2.	**Midterm exam 2**	Around 7^{th} and 8^{th} week	15%
3	**Attendance, Participation, Assignments, Presentations, Essay, Data Search**	Throughout course duration	10%
3.	**Lab Reports**	Throughout the course duration	5%
4.	**Final Lab Exam**	15th week	15%
5.	**Final exam**	16^{th} week	40%

*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	**-IUCN's Protected Area Governance and Management. (2014) (World Commission on Protected Areas).** **-Protected Areas Management (2017). Weston Allen (Editor). Larsen and Keller Education.** **ISBN 978-1635492385** **-Managing Protected AreasA Global Guide.(2006). Michael Lockwood, Graeme L., andAshish Kothari (Editors). Routledge. ISBN 9781844073030**
Supportive References	**-https://www.protectedplanet.net/en** **-https://www.oursafetynet.org/2021/01/14/why-linking-protected-areas-is-crucial-for-wildlife-movement/** **https://portals.iucn.org/library/sites/library/files/documents/PAG-021.pdf**
Electronic Materials	**-**
Other Learning Materials	**-**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratory
Technology equipment (projector, smart board, software)	Projector and smartboard
Other equipment (depending on the nature of the speciality)	-

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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Ecology of Palm Tree
Course Code:	EVS 1364
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 (2 Lecture + 2 Lab)					
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 involves most of the important information about the Ecology of palm trees and an examination of palm tree etymology, and types of dates It introduces taxonomy, morphology, reproductive biology, anatomical, and physiological characteristics of the palm tree. In addition, It Covers The environmental, cultural, and economic importance of this tree and the Nutritional value and health benefits of fruits. It also covers environmental and geographical information, species diversity and distribution, problems and challenges facing palm trees, ways to protect them and sustainable development.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110	**EVS 1112**	**EVS 1114**			
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The course intends to: **-Provide students' knowledge of the Ecology of palm trees.** **-Explaining how the palm tree is affected by environmental conditions, its interaction with biotic and abiotic factors, and ways of adapting with the environment.** **- Identify The environmental, cultural, and economic importance of the palm tree, Nutritional value and health benefits of fruits.** **- Identify common palm trees varieties grown in Saudi Arabia.**					

-Describe how human activity impacts on the Ecology of palm trees.
-Comprehend the dimensions of the sustainability challenge.

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**	-
4.	**Tutorial**	-
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 Ecology of palm trees.**	K1-K2	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	**Discuss The environmental, cultural, and economic importance of the palm tree, Nutritional value and health benefits of fruits.**	K2	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work
1.3	**Clarify the dimensions of the sustainability challenge.**	K3-K4	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work
2.0	**Skills**			
2.1	**Analyze how the palm tree is affected by environmental conditions, its interaction with biotic and abiotic factors, and ways of adapting with the environment.**	S2-S4	-Lectures -Classroom discussions -Cooperative education	-Classroom participation -Presentations - Written exams
2.2	**Evaluate how human activity impacts on the Ecology of palm trees**	S1-S3	-Lectures -Classroom discussions -Cooperative education	Classroom participation -Presentations -Assignments -written exams
3.0	**Values, autonomy, and responsibility**			
3.1	**Participate in work and communicate effectively in groups.**	V1-V2	--Lectures -Classroom discussions -Research	-Classroom participation -Presentations
3.2	**Adhere assigned tasks with responsibility.**	V3-V4	-Lectures -Classroom discussions	-Classroom participation -Presentations

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	Introduction, Syllabus. General information of palm tree (definition – history-Taxonomic status)	4
2.	Morphological, the reproductive biology, anatomical, and physiological characteristics of the palm tree	4
3.	The environmental, cultural, and economic importance of the palm tree, Nutritional value and health benefits of fruits.	4
4.	Geographical ecology of the palms: determinants of diversity and distributions across spatial scales	4
5.	Impacts of different environmental: biotic, abiotic and historical factors	4
6.	Determinants of palm species distribution: Climate, Topography, Species interactions, Soil, Dispersal, Hydrology and Vegetation.	2
7.	Adaptations and modifications of palm trees to environmental conditions.	2
8.	Identify common palm trees varieties grown in Saudi Arabia.	2
9.	Problems and challenges facing palm trees	2
10.	How species diversity is maintained Locally and globally, Maintaining sustainable.	2
Total		**30**

No	List of Topics (Lab)	Contact Hours
1.	Introduction: General principles of palm tree: a taxonomic overview of palms.	**4**
2.	Morphological studies of the palm tree	**4**
3.	Anatomical studies of the palm tree	**4**
4.	Techniques and methods for quantifying environmental characteristics of palm tree (Climate, soil…etc.)	**4**
5.	Community structure of palm tree: species richness, evenness and diversity of community (Plant and animal) using different indices.	**2**
6.	Collective analysis and discussion (Scientific papers and documentary videos of studies that have assessed the relationship between climate and palm).	**4**
7.	Collective analysis and discussion (Scientific papers and documentary videos on economic , cultural importance of the palm tree).	**4**
8.	Collective analysis and discussion (Scientific papers and documentary videos on Local palm Species and methods of propagation).	**4**
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	-Geographical ecology of the palms (Arecaceae): determinants of diversity and distributions across spatial scales.2011. Annals of Botany 108: 1391– 1416. By Wolf L. Eiserhardt et. -Conservation Biology for all. 2010. edited by Sodhi, N. S, and P. R. Ehrlich. Oxford University Press. -Field and Laboratory Activities for Environmental Science. 2012. Eldon Enger ،Bradley F. Smith -Jain, Shri Mohan, Al-Khayri, Jameel M., Johnson, Dennis V. Date Palm Biotechnology, 2011, XVIII, 743p. 161 illus.
Supportive References	
Electronic Materials	• Saudi Digital Library • http://www.fao.org/docrep/006/y4360e/y4360e00.htm • www.britannica.com/EBchecked/topic/152224/date-palm • www.redpalmweevil.com/introDatepalm.htm • www.experiencefestival.com/date_palm_-_production • www.un.org/News/Press/docs/2004/sag276.doc.htm • http://www.pubhort.org/datepalm/datepalm1/datepalm1_28.pdf • http://postharvest.ucdavis.edu/files/71533.pdf

	•• http://www.redpalmweevil.com/introdatepalm.htm
Other Learning Materials	Videos, slides and presentations that are available with the instructor.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	Environment-related instruments

F. Assessment of Course Quality

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

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Integrated Coastal Ecosystems
Course Code:	EVS 1366
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

. General information about the course:

1. Course Identification

1. Credit hours: 3 (2 Lectures + 2 Lab)					
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 provides an examination of the key elements and complex processes (physical, biogeochemical and biological) that shape and influence estuarine and coastal ecology. The course will explore the highly dynamic nature of estuaries and coasts through the study of a wide variety of coastal systems, including coastal lagoons, coastal embayment and river estuaries. Students will examine the effects of catchment development on nutrient and sediment loads and the consequences for biological production and biodiversity. The course will also address issues of ecosystem functioning, appropriate ecosystem monitoring programs and the use of key indicators as a measure of ecosystem health. All lectures are recorded and the practical component is completed within three weeks of the semester. This course has a compulsory field trip component. Details and costs will be advised in the course outline and on the course Blackboard site prior to the start of the semester.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1114					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
To equip students with a comprehensive understanding of coastal ecosystems, emphasizing their structure, functioning, and the complex interactions between terrestrial, marine, and human components. This course aims to foster critical thinking and problem-solving skills by exploring the principles of ecology, conservation biology, and environmental management within coastal contexts. Students will learn to evaluate the impacts of natural and anthropogenic influences on coastal ecosystems and develop integrated approaches for sustainable management and conservation strategies. Through lectures, fieldwork, and					

research projects, students will gain practical and theoretical knowledge, preparing them to contribute effectively to the preservation and restoration of these vital ecosystems.

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 Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the different coastal habitats and the geomorphological and hydrological processes that shape these environments.	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	Describe the Important Ecological Processes That Operate in Estuaries and the Coastal Zone	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	Describe the ecological dynamics, including nutrient cycling, food webs, and biological interactions in estuarine and coastal environments	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.4	Identify Coastal Habitats and the Physical Processes That Contribute to Their Formation	K4	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	Skills			
2.1	Employ skills of field observation and data collection techniques to measure and interpret physical and ecological parameters	S1	Laboratory and take-home research assignment	Lab reports and Lab exam
2.2	Analyze the Important Ecological Processes that Operate in Estuaries and the Coastal Zone	S2	Laboratory and take-home research assignment	Lab reports and Lab exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Apply analytical tools and models to study and predict ecological processes	S3	Laboratory and take-home research assignment	Lab reports and Lab exam
2.4	Synthesize information about assessments of ecosystem health and management Processes	S4	Laboratory and take-home research assignment	Lab reports and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Share in the discussions on coastal ecosystems and present data effectively	V1	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.2	Show independence and collaborate with a team	V2	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.3	Adhere to ethical practices relevant to sustainable development in coastal environments	V3	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (Lecture)	Contact Hours
1.	**Module 1: Introduction to Coastal Ecosystems** • **Overview of Coastal Zones:** Definitions, importance, and global significance. • **Types of Coastal Ecosystems:** Beaches, dunes, estuaries, mangroves, coral reefs, salt marshes, and their specific characteristics. •	4
2.	**Module 2: Physical Processes Shaping Coastal Ecosystems** • **Coastal Geomorphology:** Formation of coastal landforms, sediment dynamics. • **Hydrological Processes:** Tides, waves, currents, and their effects on coastal shaping. **Climate Influence:** Sea-level rise, temperature changes, and other climatic factors impacting coastal zones.	4
3.	**Module 3: Ecological Dynamics and Biodiversity** • **Primary and Secondary Production:** Energy flow, nutrient cycling, and food webs in coastal environments. • **Species Interactions:** Competition, predation, symbiosis in coastal habitats. **Biodiversity Patterns:** Spatial and temporal distribution of species and communities.	4
4.	**Module 4: Human Impacts and Coastal Management** • **Anthropogenic Pressures:** Pollution, overfishing, habitat destruction, coastal development. • **Conservation Strategies:** Protected areas, species management, habitat restoration. **Policy and Legislation:** Overview of local, national, and international regulations affecting coastal ecosystems.	4
5.	**Module 5: Research Techniques and Data Analysis** • **Field Methods:** Sampling techniques, remote sensing, and GIS applications. • **Laboratory Methods:** Analysis of physical and biological samples. **Data Analysis and Modeling:** Statistical techniques and ecological modeling for data interpretation	4

6.	**Module 6: Case Studies and Management Practices** • **Ecosystem Health Assessments:** Methods to assess and monitor ecosystem health. • **Management in NSW:** Review of specific management strategies employed in New South Wales and their outcomes. **Global Case Studies:** Comparisons of management practices and outcomes in different regions of the world	**4**
7.	**Module 7: Ethical Considerations and Future Challenges** • **Sustainable Development:** Balancing ecological health with economic and social needs. • **Ethical Issues:** Considerations in biodiversity conservation, environmental justice, and stakeholder involvement. • **Future Trends:** Emerging issues and innovative solutions in coastal ecosystem management. •	**2**
8.	**Practical Workshops and Field Trips** • **Hands-on Training:** Field trips to various coastal sites for practical experience in data collection and ecosystem observation. • **Interactive Workshops:** Application of tools and techniques in real-world scenarios, including GIS mapping and ecological impact assessments.	**2**
9.	**Capstone Project** • **Research Project:** Students will conduct a group or individual project focusing on a specific issue in coastal ecosystem management, culminating in a written report and presentation	**2**
Total		**30**

No	List of Topics (Lab)	Contact Hours
1.	**Lab 1: Introduction to Coastal Ecosystem Field Techniques** • **Objective:** Familiarize students with basic field equipment and techniques used in coastal research. • **Activities:** Training in GPS usage, sediment sampling, water quality testing, and biological survey methods.	**4**

2.	**Lab 2: Sediment Analysis Techniques** • **Objective:** Teach students how to analyze sediment samples to understand sediment composition, grain size, and deposition patterns. • **Activities:** Sieving, sediment sorting, and microscope analysis of sand, mud, and organic content.	4
3.	**Lab 3: Coastal Plant Identification and Zonation** • **Objective:** Study plant species that inhabit different zones of coastal environments and understand their ecological roles. **Activities:** Field trip to local coastal areas for direct plant identification, zonation mapping, and understanding plant adaptations to coastal environments	4
4.	**Lab 4: Water Quality Assessment in Coastal Areas** • **Objective:** Evaluate water quality parameters that influence coastal ecosystems using chemical and biological indicators. • **Activities:** Testing for nutrients, pH, salinity, dissolved oxygen, and microbial analysis.	2
5.	**Lab 5: Coastal Fauna Surveys** • **Objective:** Conduct surveys to identify and assess the abundance and health of fauna in various coastal habitats. • **Activities:** Use of nets, traps, and visual observation techniques to survey aquatic and terrestrial wildlife.	2
6.	**Lab 6: GIS and Remote Sensing Applications** • **Objective:** Introduce Geographic Information Systems (GIS) and remote sensing technologies for mapping and analyzing coastal features. • **Activities:** GIS mapping of habitats, erosion rates, and anthropogenic impacts using satellite images and aerial photographs.	4
7.	**Lab 7: Impact of Human Activities on Coastal Ecosystems** • **Objective:** Examine the effects of human interventions like coastal development and pollution on coastal ecosystems. • **Activities:** Field assessments at sites with varying degrees of human impact, data collection on ecosystem health, and impact analysis. •	2

8.	**Lab 8: Restoration Techniques for Coastal Habitats** • **Objective:** Learn about various habitat restoration techniques and participate in a local restoration project. • **Activities:** Planting vegetation, stabilizing dunes, restoring oyster reefs, or other habitat restoration activities.	2
9.	**Lab 9: Climate Change Effects on Coastal Systems** • **Objective:** Study the impacts of climate change variables, such as sea-level rise and increased storm frequency, on coastal ecosystems. • **Activities:** Modeling exercises, reviewing case studies, and predicting future changes using ecological data.	2
10.	**Lab 10: Designing a Coastal Management Plan** • **Objective:** Apply learned techniques and knowledge to propose a management plan for a specific coastal area. • **Activities:** Group projects to assess ecosystem health, identify key threats, and develop integrated management strategies based on scientific data	4
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	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. **"Introduction to Coastal Processes and Geomorphology" by Robin Davidson-Arnott** • Provides fundamental insights into the physical processes that shape coastal environments. 2. **"Estuarine Ecology" by John W. Day, Jr. et al.** • Covers the ecological aspects of estuarine environments, emphasizing interactions between biological communities and the physical environment. 3. **"Coastal Management: Global Challenges and Innovations" edited by Nobuo Mimura and Ian S. F. Jones** • Explores contemporary issues in coastal management with case studies from around the world, discussing innovative solutions and policies.
Supportive References	• **Journal of Coastal Research** • Offers research articles on all aspects of coastal studies, including geomorphology, biology, and management. • **Coastal Management Journal** • Focuses on policy, law, and management practices affecting coastal environments. • **Marine Ecology Progress Series** • Publishes research on marine ecosystems, including coastal and estuarine studies
Electronic Materials	• **NOAA Office for Coastal Management (coast.noaa.gov)** • Provides a wealth of resources, including data tools, training, and information on coastal management practices. • **The Nature Conservancy's Coastal Resilience Network (coastalresilience.org)** • Offers tools and case studies on enhancing coastal resilience against natural disasters and climate change impacts. • **MarineBio Conservation Society (marinebio.org)** • An educational resource with extensive information on marine life and ecosystems.
Other Learning Materials	-

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 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 Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

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

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Atmospheric Environments
Course Code:	EVS 1368
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: 2 (Lecture 2+ 0 Lab)					
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 is an introduction to the physical processes occurring in the Earth's atmosphere. Interpretation of weather maps and satellite images, cloud types and formation, atmospheric structure, thermodynamic processes, rain formation, solar and terrestrial radiation, energy balance at the surface, cumulus and cumulonimbus convection, and air pollution.

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

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

EVS 1111

7. Course Main Objective(s):

This course aims to prepares the student for understanding the impact of the weather and climate on the environment, which is to say the impacts of air and water on natural and human-altered ecosystems. This course establishes links between atmospheric studies and a variety of environmental disciplines pertaining to land, water, soils, and plants

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	
Total		30

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 atmospheric composition and structure, including the layers of the atmosphere from the surface to 100 km, and be able to describe the basic processes occurring in the atmospheric boundary layer and recognize cloud types and	K1	Three credits hours weekly lectures, lab and field	-Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	their formation mechanisms			
1.2	Explain the structure, physics and dynamics of thunderstorms, tornadoes and hail formation	K2	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
1.3	Outline the basic physics of atmospheric processes, such as radiation at the surface, water in the atmosphere and its phase changes, and air masses and weather fronts;	K3	Three credits hours weekly lectures, lab and field	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	Synthesize and interpret meteorological data, including satellite imagery, and summarise professionally within an assignment	**S1**	Three credits hours weekly lectures, lab and field Tutorials	-Presentations -Assignments -written exams
2.2	Use and evaluate numerical and graphical meteorological data, e.g., interpret weather maps in terms of local weather; plot and interpret vertical temperature and moisture soundings; observe, code and plot weather elements in standard format.	**S2**	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Assignments -written exams
2.3	Analyse large weather and climate related datasets using appropriate computing tools and methodologies.	**S3**	- Three credits hours weekly lectures, lab and field -Tutorials	-Presentations -Assignments -written exams
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate 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 specialized events and present research data effectively	**V2**	Group discussions	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	through different modes and for varied audiences.			
3.2	Show 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.	Syllabus Overview, introduction to weather maps and satellite imagery	4
2.	Atmospheric structure, meteorological observations, interpreting charts	4
3.	Atmospheric structure, meteorological observations, interpreting charts	4
4.	Air masses and weather fronts	4
5.	Clouds and precipitation	2
6.	Vertical profiles through the atmosphere: physics, stability, thunderstorms	4
7.	Vertical profiles through the atmosphere: physics, stability, thunderstorms	2
8.	Atmospheric radiation, surface energy balance, rainbows	2
9.	Atmospheric radiation, surface energy balance, rainbows	2
10.	Air pollution	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	20%
2.	Midterm 2	Around 7th - 8th week	20%
3.	Quizzes, Participation, and Attendance	During the semester	20%
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	Atmospheric Science: An Introductory Survey (2nd Ed), J.M. Wallace and P.V. Hobbs Weather: A Concise Introduction Introducing Meteorology: A Guide to Weather, J. Shonk
Supportive References	Undergraduate Course: Meteorology: Atmosphere and Environment- University of Edinburgh BSc Meteorology and Climate- University of Reading
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of students assessment	Faculty	Direct
Quality of learning resources	Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	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**

Course Specification

(Bachelor)

Course Title:	Breeding Ecology of Camels
Course Code:	EVS 1470
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: (7th Level/ 4th Year)					
4. Course General Description:					
This course provides an in-depth exploration of the breeding ecology of camels, focusing on the biological, ecological, and behavioural aspects that influence camel reproduction and population dynamics. Participants will gain a comprehensive understanding of the reproductive physiology of camels, mating systems, breeding strategies, and the environmental factors affecting their reproductive success.					
5. Pre-requirements for this course (if any):					
EVS1110 EVS 1111					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
1. **Understand the anatomical and physiological aspects of camel reproduction.** 2. Identify the different mating systems and breeding strategies employed by camels. 3. Analyze the environmental factors influencing camel reproductive success and population dynamics. 4. Evaluate the role of genetics in camel breeding and conservation. 5. Discuss the challenges and opportunities in camel breeding programs for sustainable agriculture and livestock production.					

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		30

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	Outline the biological characteristics and adaptations of camels that influence their breeding ecology.	K1	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams
1.2	Discuss the reproductive physiology of camels, including the estrous cycle, mating behavior, and gestation period.	K2	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	State the strategies of camels in their native habitats and the factors that influence successful breeding in captivity.	K2	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.4	Clarify how environmental factors such as climate, food availability, and habitat quality impact camel breeding patterns and reproductive success.	K3	Two credits weekly lectures Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.5	Explain the role of breeding ecology in camel conservation efforts, including captive breeding programs, habitat conservation, and genetic diversity preservation.	K4	Two credits weekly lectures Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	Perform research through hands-on fieldwork, data collection, and analysis related to camel breeding ecology.	S1	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	Analyze data on various aspects of camel breeding ecology using the various statistical methods	S2	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	Apply the information theory, maximum likelihood estimation, and generalized linear modelling in studying wildlife populations	S3	-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	Share in discussions on how and why species are monitored and/or captured for wildlife population management.	V1	Group discussions	-Presentations -Reports
3.2	Participate in specialized meetings and present data through different modes.	V2	Group discussions	-Presentations -Reports
3.2	Show independency in carrying out research studies in the field	V3	Group discussions	Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	of wildlife conservation and management			

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction, Syllabus.** Introduction and History of Wildlife Conservation Perspectives and philosophical perspective; Cultural foundation	4
2.	**Introduction to Camel Biology** Overview of Camel Species Physical Characteristics and Adaptations Behavioural Ecology of Camels	4
3.	**Reproductive Physiology of Camels** Female Reproductive Anatomy and Physiology Male Reproductive Anatomy and Physiology Hormonal Regulation of Reproduction	4
4.	**Breeding Strategies in Native Habitats** Natural Breeding Behaviour Seasonal Breeding Patterns Mating Systems and Strategies	2
5.	**Environmental Influences on Breeding** Impact of Climate on Reproduction Food Availability and Nutritional Requirements Habitat Quality and Breeding Success	2
6.	**Breeding Management Techniques** Artificial Insemination in Camels Breeding Season Manipulation Genetic Selection and Breeding Programs	2
7.	**Reproductive Health and Care** Common Reproductive Disorders Veterinary Care and Reproductive Health Management Nutrition and Reproductive Health	2
8.	**Conservation and Breeding Ecology** Captive Breeding Programs	2

	Habitat Conservation and Restoration Genetic Diversity and Population Management	
9.	**Ethical and Welfare Considerations** Ethical Issues in Camel Breeding Animal Welfare and Husbandry Practices Human-Camel Interactions and Cultural Perspectives	2
10.	**Research Methods in Camel Breeding Ecology** Field Research Techniques Data Collection and Analysis Methods Research Ethics and Integrity	2
11	**Communication and Reporting** Writing Research Reports Presenting Findings and Data Peer Review and Publication	4
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, Essays	During the semester	10%
4.	Final Lab Exam	15th week	20%
4.	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- "The Camel: Its Evolution, Ecology, Behaviour, and Relationship to Humans" by Shirley C. Strum and Linda M. Fedigan 2- Camel Breeding and Genetics" edited by Faisal M. Almathen, Hanotte O., and K. E. Fitzhugh

Supportive References	
Electronic Materials	1- International Camel Consortium for Genetic Improvement Offers information on camel genetics, breeding programs, and conservation initiatives. 2- Camel Research Centre (CRC) CRC's website offers research articles, publications, and information on camel biology, reproduction, and management.
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Waste Management and Recycling
Course Code:	EVS 1472
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: 2 (Lecture 2, Lab 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 7/ 4th Year)					
4. Course General Description:					
This module aims to provide the students with an introduction to waste management and recycling and an overview of its environmental impacts. The objective of the course is to show how the waste management and recycling process can help the environment for cleanliness how waste materials can be converted to produce industrial products and how it can be a useful product for the country and human beings.					
5. Pre-requirements for this course (if any)**:**					
EVS 1326 Environmental Pollution and Bio-degradation					
None					
7. Course Main Objective(s):					

- Understand the importance of the environmental impact of waste management and recycling
- Explain various models of Waste management and recycling
- Understand basic concepts and tools used for waste management and recycling to solve the environmental pollution problems
- Describe the process of recycling and conversion of waste to industrial products.
- An understanding of valuable methods of waste management and recycling
- Understand the various environmental policies and instruments used in environmental waste management.
- Provide environmentally eco-friendly services and industrial products from waste management and recycling materials as well as solve the air pollution, water pollution, and semi-solid and solid waste deposition problems in society.
- Explain the relationship between economic industrial growth and bioproducts development and its impact on the environment.

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain the importance of the environmental impact of waste management and recycling	**K1**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	Outline the various models of Waste management and recycling	**K2**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	Discuss the basic concepts and tools used for the waste management and recycling to solve the	**K3**	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	environmental pollution problems			
2.0	**Skills**			
2.1	Relate the process of recycling and conversion of waste to industrial products and understanding of valuable methods of waste management and recycling	**S1**	Take-home research assignment	Activity and exam
2.2	Evaluate the various environmental policies used in environmental waste management and recycling.	**S2**	Take-home research assignment	Activity and exam
2.3	Analyze the environmentally eco-friendly services and useful industrial products from waste management and recycling materials.	**S3**	Take-home research assignment	Activity and exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Show independence and responsibility and cooperate effectively in a team to carry out research work	**V1**	Group discussions	-Presentations -Reports
3.2	Share in the discussion of the scientific issues and present research results via oral presentations and in written format.	**V2**	Group discussions	-Presentations -Reports
3.3	Adhere to the relevant ethical rules	**V3**	Group discussions	-Presentations -Reports

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Introduction to waste, disposal and recycling	**4**
2.	Sources types and composition of different wastes	**4**
3.	Physical, chemical and biological properties of Agro-Biological waste	**4**
4.	Physical, Chemical and biological properties of municipal waste	**2**
5.	Waste collection, handling separation and storage processing	**2**
6.	Waste separation processing and transformation (transfer and transport Processing) and reduction of greenhouse gas emission	**2**
7.	Treatment of waste: Biological and Chemical conversion of solid and semisolid waste, Industrial waste and food waste	**2**
8.	Recycling of waste for materials production (Plastic, Municipal and Agrowaste, food waste) and pollution control	**4**
9.	Soruce reduction of waste toward zero waste and people’s responsibility for waste management	**4**
10.	Landfill design and recycling Industries establishment and pollution control	**2**
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	20%
2.	Midterm exam 2	Around 7th - 8th week	20%
3.	Quizzes, Participation, and Attendance ,Data search assignment	During the semester	20%
4.	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	Ioannis S. Arvanitoyannis, Waste Management for the Food Industries. Elsevier Inc. 2008. Agamuto S. Solid waste Management and Practices, University Malaya Press, Kuala Lumpur. 2009.
Supportive References	Sadhan Kumar Ghosh, Recent Trends in Waste Water Treatment and Water Resource Management. Springer Nature Singapore Pte Ltd. 2020. Paul T. Williams, Waste Treatment and Disposal. John Wiley & Sons Ltd, The Atrium, 3 Southern Gate, Chichester, West Sussex PO19 8SQ, England 2005 Hossain ABMS and M. Aleissa. Bioconversion and Bioprocess of waste. Lambert Academic Publishing Co. 2014.
Electronic Materials	• Saudi Digital Library https://www.sdl.edu.sa/SDLPortal/Publishers.aspx
Other Learning Materials	Videos, slides and presentations

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 Smart board
Other equipment (depending on the nature of the speciality)	Environmental Microbiology-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 Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

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

Course Specification
(Bachelor)

Course Title:	Environmental Law and Policy
Course Code:	EVS 1474
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: 2 (Lecture 2 + 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 7 / 4th Year)					

4. Course general Description:
This course provides a survey of the basic legal principles, regimes, and issues related to environmental protection and natural resource management. It introduces students to the fundamentals of environmental law and policy, including how the legal system works and relevant principles of common law. After building this foundation, the course focuses primarily on the National Environmental Policy Act, the Clean Water Act, the Endangered Species Act, and the Clean Air Act. Some national and international issues will also be addressed. By the end of the course, you will have a grounding in basic legal principles, along with the core principles of environmental law and regulation and how they are changing over time.
5. Pre-requirements for this course (if any)**:**
EVS 1110
6. Co-requisites for this course (if any)**:**
None
7. Course Main Objective(s):
1- This course provides a survey of the basic legal principles, regimes, and issues related to environmental protection and natural resource management. It introduces students to the fundamentals of environmental law and policy.to provide an understanding of the sources, principles, institutions and processes of international environmental law 2- Explore the implementation and effectiveness of international environmental agreements in the context of Saudi Arabia, the GCC and the Middle East;

3- to develop students' capacity to undertake independent legal research using primary and secondary legal sources.
4- to develop students' ability to serve clients (e.g. governments, international organizations, corporations, private clients) who seek assistance in this area of law.

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**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		30

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 structure of the international legal system in the context of international environmental protection.	K1	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	Outline the sources, principles, institutions and processes of international environmental law	K2	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	Analyze the implementation and effectiveness of international environmental agreements in the context of Saudi Arabia, the GCC and the Middle East	S1	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	Perform legal research using primary and secondary legal sources	S2		
3.0	Values, autonomy, and responsibility			
3.1	Share in specialized meetings and present data effectively through different modes	V2	Group discussions	-Presentations -Reports
3.2	Adhere to ethical standards and values behind the international environmental laws	V4		

C. Course Content

No	List of Topics	Contact Hours
1.	History and Development of International Environmental Law Environmental Values	4
2.	Saudi Arabia decree on Environment protection General Environment issued by Royal Decree No. M / 43 82 2388 e / 7 / ARAMCO environment policy	4
3.	Common Law Approaches to Environmental Issues	4
4.	National Environmental Policy Act (NEPA)	4
5.	Protection of Species Discussion	2
6.	Food Security, Genetically Modified Organisms (GMOs) and Regulation of Plant Genetic Resources Discussion.	**2**
7.	Air Quality	2
8.	Water Quality	2
9.	Energy	2
10.	Waste management	2
11	Review and Final Project	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	20%
2.	Midterm 2	Around 7th - 8th week	20%
3.	Quizzes, Participation, Attendance, Presentations	During the semester	20%
4.	Final Exam	Around 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	Salzman, J., & Thompson, B. H., Jr. (2019). Environmental Law and Policy (5th ed.). Foundation Press. (E-Book option available) ISBN: 978-1683287902 Sands, P. and J. Peel, Principles of International Environmental Law (Cambridge: Cambridge University Press, 4th ed., 2018). ISBN: 9781108431125 https://www.cambridge.org/highereducation/books/principles-ofinternational-environmentallaw/B32CA39427B24F1947BDC5F884CCADC0#ov
Supportive References	
Electronic Materials	EcoLex: Gateway to Environmental Law www.ecolex.org American Society for International Law: Guide to International Law http://www.asil.org/resource/treaty1.htm International Court of Justice https://www.icj-cij.org/en
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	-

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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Renewable Energy Systems
Course Code:	EVS 1476
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 (2 Lectures + 2 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 7 /4th Year)					

4. Course General Description:

This course offers an introductory exploration into renewable energy systems, focusing primarily on solar, water, and wind energy technologies. Its goal is to provide students with a fundamental understanding of the potential and practical applications of solar, wind, hydroelectric, biomass, and geothermal energy. The course will cover the design, operation, and integration of renewable energy systems into existing energy infrastructure, as well as the environmental, economic, and social implications of renewable energy arrangement. Students will explore the advantages, limitations, and potential of various energy sources including wind, solar, small-scale hydro, ground-source heat pumps, combined heat and power, biofuels, fuel cells, and other emerging technologies. Through the course, students will gain insight into the strategies and cost-benefit analyses used by energy analysts to fulfill energy demand through clean energy production. Additionally, students will undertake a study and develop a proposal for their own renewable energy project.

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

EVS 1110 / EVS 1114

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

None

7. Course Main Objective(s):

Familiarizing students with renewable energy resources as viable alternatives to finite sources. The course also aims to equip students with a comprehensive understanding of renewable energy sources, including their utilization for electricity generation, system components, characteristics, sizing, and applications in both centralized and decentralized electrical power supply systems, spanning small-scale to large-scale implementations Providing insight into the current and future global and national energy demands in relation to available renewable energy resources, enabling analysis and understanding. Offering a concise overview of the fundamentals of solar energy and photovoltaic cells. Explore the different technologies and components involved in harnessing renewable energy, including solar photovoltaics, wind turbines, hydroelectric generators, biomass conversion systems, and geothermal heat pumps. Learn about the design considerations, performance characteristics, and operational principles of renewable energy systems.

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 Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify Energy Production Systems and Sustainable Energy Conversion Processes	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	Discuss Solar Radiation and Characteristics of Photovoltaic Systems	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	State Wind Power and Technologies for Energy Conversion	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	**Skills**			
2.1	Show proficiency in utilizing critical thinking and problem-solving skills to assess business energy usage, and determine appropriate applications of renewable energy solutions	S1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.2	Analyze and comprehend the challenges associated with the integration of renewable energy systems, and effectively evaluate potential obstacles to implementation.	S2	-Tutorials	-Presentations -Assignments -written exams
2.3	Evaluate the benefits, drawbacks, and potential of various clean energy sources tailored to the needs of buildings and businesses, and demonstrating a comprehensive	S3	-Tutorials	-Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	understanding of their suitability and efficacy.			
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate understanding and awareness of the regulatory frameworks governing renewable energy projects, including compliance requirements and permitting processes.	V1	Laboratory and take-home research assignment	Lab reports and Lab exam
3.2	Show accountability in presenting a comprehensive proposal for a clean energy project, integrating knowledge of technical, financial, regulatory, and policy aspects to offer a feasible and compelling plan.	V2	Laboratory and take-home research assignment	Lab reports and Lab exam
3.3	Share actively in specialized activities	V3	Laboratory and take-home research assignment	Lab reports and Lab exam

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	**Principles of Renewable Energy** • Introduction to renewable energy • Energy and sustainable development • Scientific principles of renewable energy	4
2.	**Fundamentals of Solar Energy** • Introduction • Radiation Fundamentals • Radiative Properties • Solar Radiation • Estimation of Solar Radiation	4
3.	**Solar Energy Applications** • Introduction • Flat-plate solar collector • Evacuated Tube collectors • Concentrating Solar collector	4
4.	**Water Energy** • Hydropower Systems • Turbines • Micro-hydro Systems • Environmental Impacts and Mitigation	4
5.	**Wind Energy** • Wind energy fundamentals and resource assessment • Wind turbine technology and design considerations • Wind farm siting and optimization	2
6.	**Biomass Energy** • Biomass Resources • Bioenergy production pathways (biogas, biofuels, biomass combustion) • Biomass resources and sustainability considerations	2

7.	**Integration of Renewable Energy Systems** • Grid integration challenges and solutions • Energy storage technologies (batteries, pumped hydro, thermal storage) • Smart grids and demand-side management • Hybrid renewable energy systems and microgrids	2
8.	**Renewable Energy Economics** • Levelized cost of energy analysis • Financial modelling and project financing • Economic evaluation methods • Risk assessment and mitigation strategies	2
9.	**Emerging Trends and Future Directions** • Advanced renewable energy technologies • Energy transition pathways and scenarios • Innovation in renewable energy research and development • Socioeconomic implications and societal acceptance of renewable energy	2
10.	**General revision-I**	2
11.	**General revision-II**	2
Total		**30**

No	List of Topics (Lab)	Contact Hours
1.	The components of solar flat plate collector	4
2.	The components of tube solar thermal system	4
3.	The components of the solar dryer system	4
4.	Quantify heat output, maximum power, and power output efficiency of solar energy systems.	4
5.	Construct or disassemble horizontal axis small wind turbines.	2
6.	Construct or disassemble vertical axis small wind turbines.	2
7.	Quantify the power output generated by the turbine	2
8.	Construct a hydropower system	2
9.	Quantify the power output generated by the hydropower system	2
10.	Construct a biogas system	2
11.	Quantify the power output generated by a biogas system	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, Assignments, 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	1 Mehmet Kanoglu, Yunus A. Cengel, John M. Cimbala. Fundamentals and Applications of Renewable Energy. McGraw Hill; 2nd edition (July 21, 2023). ISBN-13 : 978-1265079659 2 John Twidell and Tony Weir. Renewable Energy Resources. 2015, Routledge is an imprint of the Taylor & Francis Group, an informa business
Supportive References	Felix A Farret and M. Godoy Simoes. Integration of Renewable Sources of Energy, 2nd Edition, , Wiley, 2018, ISBN: 978-1-11-913737-5
Electronic Materials	None
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 speciality)	

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	Faculty	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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Remote Sensing Applications
Course Code:	EVS 1478
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 (2 Lecture + 2 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 7 / 4th Year)					
4. Course General Description:					
This course will focus on acquiring images of the Earth's surface from spacecraft, aircraft and drones to aid in the monitoring and management of the natural and built environments. Extensive computer-based analysis techniques are used to extract information from the recorded images in support of applications ranging over many earth and information science disciplines. This course covers the fundamental nature of remote sensing and the platforms and sensor types used. It also provides an in-depth treatment of the computational algorithms employed in image understanding, ranging from the earliest historically important techniques to more recent approaches based on deep learning. The course material is extensively illustrated by examples and commentary on how the technology is applied in practice.					
5. Pre-requirements for this course (if any):					
EVS 1110 / EVS 1114 / EVS 1368					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
The objective of these courses is to provide students with knowledge and skills to apply remote sensing in various fields, understand the complex dynamics between remote sensing, and use this knowledge in their future research work. In addition to understand the theory behind Remote Sensing analyses and complete practical Remote Sensing based applications, using a range of sensors and methodologies. Introduce a selection of					

methods and analytical skills that can be used in practical applications within Earth Observation and Spatial Analysis.

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**	4
5.	**Others (specify)**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Describe and discuss a set of methods to analyse, interpret and assess remotely sensed imagery**	K1	Lecture, lab and take-home research assignment	Quizzes, midterm ,lab exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	**Define and explain the key concepts and terminologies used in remote sensing**	K2	Lecture, lab and take-home research assignment	Quizzes, midterm ,lab exam and final exam
1.3	**Explain how the electromagnetic spectrum interacts with the terrestrial environment**	K3	Lecture, lab and take-home research assignment	Quizzes, midterm, lab exam and final exam
1.4	**List key platforms and sensors and their characteristics.**	K3	Lecture, lab and take-home research assignment	Quizzes, midterm lab exam and final exam
1.5	**Identify and explain common processing pathways used in remote sensing and Describe and quantify error sources within remote sensing analyses**	K4	Lecture, lab and take-home research assignment	Quizzes, midterm lab exam and final exam
2.0	**Skills**			
2.1	**Plan, manage and complete a remote sensing-based study and acquire remote sensing data and assess the suitability for analysis**	S1	lab and take-home research assignment	Lab reports and field exam
2.2	**Interpret remote sensing and GIS products and understand their metadata, and**	S2	lab and take-home research assignment	Lab reports and field exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	results of image analysis			
2.3	Apply the appropriate methods/algorithms and apply such methods/algorithms to analyse optical, radar, and topographic data	S3	lab and take-home research assignment	lab reports and field exam
2.4	Synthesize and process the data using model builder and scripting	S4	lab and take-home research assignment	lab reports and field exam
3.0	**Values, autonomy, and responsibility**			
3.1	Share in the discussion of the literature on remote sensing and GIS and present data effectively	V1	Lecture, lab and take-home research assignment	Quizzes, midterm exams, reports, project presentations, field exams and final exam
3.2	Show the ability to perform work independently and cooperate with a team	V2	Lecture, l and take-home research assignment	Quizzes, midterm exams, project presentations,
3.3	Demonstrate accountability and adhere to the relevant ethical rules	V3	Lecture, and take-home research assignment	Quizzes, midterm exams, , project presentations,

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Remote Sensing Concepts and Systems	4
2.	Applications in Environmental Sciences :Precipitation	4
3.	Meteorology and Climate	4
4.	Applications in Environmental Sciences :Hydrology and Water Resources	2
5.	Applications in Environmental Sciences :Marine and Coastal Ecosystems	2
6.	Applications in Environmental Sciences: Environmental Hazards	2
7.	Applications in Earth System Sciences: Agriculture	2
8.	Applications in Earth System Sciences: Forestry	2
9.	Applications in Earth System Sciences: Geology	2
10.	Applications in Earth System Sciences: Renewable Energy Sources	2
11.	Applications in Earth System Sciences: Land Use and Land Cover (LULC)	2
12.	1.Radar scattering from the Earth's surface 2. Sub-surface imaging and volume scattering 3. Scattering from hard targets 4. The cardinal effect, Bragg scattering and scattering from the se 5. Geometric distortions in radar imagery 6. Geometric distortions in radar imagery, cont. 7. Radar interferometry 8. Radar interferometry for detecting change 9. Considerations in radar remote sensing	2
Total		30

No	List of Topics (Field)	Contact Hours
1.	Remote sensing technologies that use sunlight, infrared radiation,	4
2.	Range of datasets and web portals,	4
3.	Radar, and lasers	4
4.	Analysis tools, water resource management	4
5.	Application to air quality	4
6.	Application to agriculture	2
7.	Application to Water	2
8.	Application to desert and land	2
9.	Tutorial Video	2
10.	Tutorial Video	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	Around 5th - 6th 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	Nicolas R. Dalezios(2021). Remote Sensing Applications in Environmental and Earth System Sciences, 1st Edition, CRC Press, USA. https://doi.org/10.1201/9781315166667 James B. Campbell, Randolph H. Wynne, and Valerie A. Thomas (2022). Introduction to Remote Sensing Sixth Edition, Guilford press, USA
Supportive References	Netzband, M. A1 - Stefanov, W.L. A1 - Redman, C. (2007. Applied Remote Sensing for Urban Planning, Governance and Sustainability, Springer Berlin Heidelberg, https://books.google.com.sa/books?id=0fTse9UL6_IC
Electronic Materials	NONE
Other Learning Materials	Blackboard

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and field
Technology equipment (projector, smart board, software)	Projector and Smartboard
Other equipment (depending on the nature of the speciality)	-

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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Arab Gulf and Red Sea Ecosystems
Course Code:	EVS 1480
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Muhammed Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (Lecture 2 + 0 + 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (Level 11 / 4th Year)					
4. Course General Description:					
This course covers the basics of marine ecology and its systems and physical and chemical properties focusing on the Ecologies of the Arabian Gulf and Red Sea, and identifying their Marine biology and wealth, as well as the challenges they face and the impact of pollution on them, and Comprehend the dimensions of the sustainability challenge for the Arabian Gulf and Red Sea Locally and globally.					
5. Pre-requirements for this course (if any):					
EVS 1110 EVS 1112 EVS 1114					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
The course intends to: - Describe the Ecology of the Arabian Gulf and Red Sea. - Discuss The environmental, cultural, and economic importance of the Arabian Gulf and Red Sea. - Analyze the marine eco-systems in the Arabian Gulf and Red Sea, and their importance and the chemical and physical properties of them. - Evaluate how human activity impacts on the eco-systems of Arabian Gulf and Red Sea. - Clarify the dimensions of the sustainability challenge.					

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**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		30

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 Ecology of the Arabian Gulf and Red Sea.**	K1-K2	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work
1.2	**Discuss The environmental, cultural, and economic importance of the Arabian Gulf and Red Sea.**	K2	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	**Clarify the dimensions of the sustainability challenge.**	K3-K4	-Lectures -Class participation	-Written exams -Class participation -Assessment of assigned work
2.0	**Skills**			
2.1	**Analyze the marine ecosystems in the Arabian Gulf and Red Sea, and their importance and the chemical and physical properties of them.**	S2-S4	-Lectures -Classroom discussions -Cooperative education	-Classroom participation -Presentations - Written exams
2.2	**Evaluate how human activity impacts on the eco-systems of Arabian Gulf and Red Sea.**	S1-S3	-Lectures -Classroom discussions -Cooperative education	Classroom participation -Presentations -Assignments -written exams
3.0	**Values, autonomy, and responsibility**			
3.1	**Participate in work and communicate effectively in groups.**	V1-V2	--Lectures -Classroom discussions -Research	-Classroom participation -Presentations
3.2	**Adhere to assigned tasks with responsibility.**	V3-V4	-Lectures -Classroom discussions	-Classroom participation -Presentations

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Introduction, Syllabus. An introductory preface to the geography of the Arabian Gulf and Red Sea and their general features.	3
2.	Ecologies of the Arabian Gulf and the Red Sea.	3
3.	Marine biology in the Arabian Gulf and the Red Sea.	3
4.	Wealth of the Arabian Gulf and the Red Sea.	3
5.	Pressures on the beach and marine environments in the Arabian Gulf and Red Sea.	3
6.	Analyze the marine ecology of the Arabian Gulf and the Red Sea and the impact of pollutants thereon.	3
7.	Coral Bleaching, Coral Diseases, Harmful Algal Blooms (HABs)	3
8.	Coastal Development.	3
9.	Coral Reef Management in the Arabian Gulf and the Red Sea.	3
10.	Comprehend the dimensions of the sustainability challenge for the Arabian Gulf and Red Sea Locally and globally.	3
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	20%
2.	Midterm 2	Around 7th - 8th week	20%
3.	Quizzes, Participation, and Attendance	During the semester	20%
6.	Final Exam	Around 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	-Conservation Biology for all. 2010. edited by Sodhi, N. S, and P. R. Ehrlich. Oxford University Press. - Vaughan, Grace O., Noura Al-Mansoori, and John A. Burt. "The arabian gulf." World seas: An environmental evaluation. Academic Press, 2019. 1-23. - Price, A. R. G., Mohiuddin Munawar, and Nuzrat Yar Khan. The Gulf ecosystem health and sustainability. Michigan State University Press, 2002. -Tesfamichael, Dawit. Assessment of the Red Sea ecosystem with emphasis on fisheries. Diss. University of British Columbia, 2012.
Supportive References	- Short, Frederick T. *World atlas of seagrasses*. Univ of California Press, 2003.
Electronic Materials	• Saudi Digital Library
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smartboard
Other equipment (Depending on the nature of the speciality)	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**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

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NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Fauna and Flora in Local Environment
Course Code:	EVS 1482
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. Credit hours: 3 (Lecture 2 + 2 Lab)

2. Course type

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

3. Level/year at which this course is offered: (8th Level / 4th year)

4. Course general Description:

This course offers a comprehensive examination of the varied plant and animal life present in the Kingdom of Saudi Arabia. Students will explore the distinct ecosystems, adaptations, and conservation issues related to the desert environment of Saudi Arabia. Participants will get a thorough comprehension of the kingdom's abundant biodiversity and the factors that impact its conservation through a blend of lectures, field trips, and research projects.

An introduction to the various species of plants and animals, both marine and terrestrial, and their distribution throughout the Kingdom of Saudi Arabia. The course will focus on the study of climate, geomorphology, and their impact on plant and animal life. It will familiarize students with the diverse range of academic fields related to wild plants and animals, including endemic and endangered species. Examination of biological classification systems and examination of both physical characteristics and reproductive characteristics linked with local plants and animals.

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

Plant Ecosystems (EVS1114) & Animal Behaviour and Environment (EVS1216)

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

None

7. Course Main Objective(s):

1. Understand the ecological significance of Saudi Arabia's flora and fauna within the context of its desert environment.
2. Identify key plant and animal species native to various regions of the kingdom and their respective adaptations to arid conditions.
3. Analyze the interdependencies among different components of Saudi Arabia's ecosystems, including plant-animal interactions and trophic relationships.

4. **Explore the cultural and economic importance of certain species to the people of Saudi Arabia, past and present.**
5. **Evaluate the current conservation status of threatened species and habitats in the kingdom and assess conservation strategies and initiatives.**
6. **Develop practical skills in field observation, data collection, and analysis relevant to studying Saudi Arabia's biodiversity.**

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**	-
4.	**Tutorial**	-
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 taxonomy, ecology, and natural history of native fauna and	K1-K2	Weekly lectures Class discussions	Quizzes, midterm exams, and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	flora in Saudi Arabia.			
1.2	Outline the principles of evolution, and conservation biology and how they are used to manage fauna and flora, and solve environmental problems.	K2-K3	Weekly lectures Class discussions	Quizzes, midterm exams, and final exam
1.3	Clarify the impacts of land use and environmental management decisions on ecosystems and society.	K2	Weekly lectures Class discussions	Quizzes, midterm exams, and final exam
2.0	**Skills**			
2.1	Demonstrate an emerging ability to identify and record observations of fauna and flora in the field.	S2-S3	Weekly lectures Class discussions	Lab reports and Lab exam
2.2	Relate the structure and physiology of native plants and animals to their survival in Saudi Arabian environments.	S2-S4	Weekly lectures Class discussions	Lab reports and Lab exam
3.3	Recognize the inherent and practical value of	S2-S4	Weekly lectures Class discussions	Presentations, reports, seminars

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	the diversity of the Saudi Arabian fauna and flora.			
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate 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 specialized events and present research data effectively through different modes and for varied audiences.	**V2**	Group discussions	-Presentations -Reports
3.2	Show 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.	Definitions and importance of fauna and flora (maintaining the ecological balance, aesthetic value, expansion of local economies).	**6**
2.	Ecology and biodiversity.	**4**
3.	Fauna and flora habitats.	**4**
4.	Fauna and flora diversity and geographic distribution.	**4**
5.	Species interactions and diversity.	**4**
6.	Plants and animals: rare species, endangered species, extinct species, endemic species, vulnerable species.	**4**
7.	Threats and maintaining fauna and flora.	**4**
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

Essential References	- Megahid A.M., 1989. Flora of Saudi Arabia, King Saud University, Riyadh. - Mandaville J.P., 1990. Flora of Eastern Saudi Arabia, John Wiley & Sons Ltd., London, 560p, ISBN: 9780203038208, DOI: https://doi.org/10.4324/9780203038208.
Supportive References	- AbuZinada A.H., 2001. First Saudi Arabian National Report on the Convention on Biological Diversity. Robinson E.R., Iyad A.N., Al Wetaid Y.I. (eds), 131p. - Wittmer W., Büttiker W., Krupp F., Mahnert V., 1988. Fauna of Saudi Arabia, volume 9, Pro Entomologia c/o Natural History Museum (eds), ISBN: 3723400086, 9783723400081.
Electronic Materials	• https://simonderbyshire.home.blog/2019/05/31/flora-and-fauna-of-saudi-arabia/ • https://www.plantdiversityofsaudiarabia.info/Biodiversity-Saudi-Arabia/Flora/Flora.htm • https://animalia.bio/saudi-arabia-animals
Other Learning Materials	

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 speciality)	-

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	-	-

(Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

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

Course Specification
(Bachelor)

Course Title:	**Research Project**
Course Code:	EVS 1499
Program:	**Bachelor of Science in Environmental science**
Department:	**Biology**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	1
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (4)					
2. Course type					
A.	☐University	☐College	☒ Department	☐ Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 8/ Fourth year)					

4. Course General Description:

This graduate course provides students with the opportunity to conduct independent research projects with the guidance of academic supervisors. A research project for students is an extended essay that presents a research question for analysis and evaluation. Conduction of the research work is the subsequent step to project planning and submission of research proposals. Assigned research projects enable students to explore areas of interest across various biology disciplines, under the supervision of academic staff members. Through the independent conduction of planned projects, students are encouraged to develop and employ a range of research skills such as a collection of data from diverse sources and systematic reviewing of the relevant literature. Proper keeping of records, interpretation and analysis of research results, safe practices under laboratory and field conditions, and presentation of scientific issues are among the targeted skills. Given these skills, the students have the chance to develop a deeper understanding of research topics that are targeted in their projects. Through this course, the students are equipped with the experience of research and project management as well as the professional skills that are crucial to performing future research work. Successful completion of this course represents the cornerstone to qualify the enrolled students for graduation.

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

None

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

None

7. Course Main Objective(s):

The major course objectives are centred on research planning, research conducting, and research reporting. According to course aims, the students are engaged in practical independent research focusing on their specializations to achieve the planned proposal objectives. The research project is planned and formulated in a proposal in terms of research purpose, background, methods, analysis of research results, and documentation. One of the major course objectives is to allow the students to independently manage research projects within a scheduled work-frame. The students should comply with the relevant ethical rules, and the safety measures appropriate to their research work. The course also aims to provide the students with practical skills concerning the selection and employment of the appropriate research methods.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	0
2	E-learning	-	0
3	Hybrid • Traditional classroom • E-learning	-	0
4	Distance learning	-	0

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	0
2.	**Laboratory/Studio**	12
3.	**Field**	48
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	Outline the sequence of preliminary steps, including topic approval, project planning and proposal submission, that precede the launch of a research project	K1	-	-Presentations -Reports
1.2	Explain how to balance the sections of description and analysis in scholarly writing and how to implement them in the final research report	K2	-	-Presentations -Reports
1.3	Describe how to prepare a checklist for the research project by listing the research resources and identifying the data sources, along with other requirements	K3, K4	-	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Relate the intended original research to the proposal objectives and current trends to execute experimental or field research work.	S1	-	-Presentations -Reports
2.2	Employ the theoretical knowledge and practical experience to apply the research methodologies for generating reliable data	S2	-	-Presentations -Reports
2.3	Apply critical thinking and professional skills to test research hypotheses and address the research questions	S3	-	-Presentations -Reports
2.4	Formulate the final research report, by including the applied methods, results, and analysis, in a way that reflects in-depth knowledge and practical skills.	S4	-	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate a strong sense of independence and, an attitude of accountability and responsibility while carrying out the research project.	V1	-	-Presentations -Reports
3.2	Participate in discussions relevant to the research project, communicate scientific issues, and present research results orally and in written formats to varied audiences	V2,V3	-	-Presentations -Reports
3.3	Adhere to the relevant ethical rules and demonstrate the ability to comply with safety procedures appropriate to the research project	V4		-Presentations -Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	**Preliminary steps of the research project:** -The nature of the research area -Finding a research topic -Feasibility of research topic -Validity of research area -Formulating a research question, statement, or hypothesis	6
2.	**Planning and designing a research project:** -Methods for testing hypotheses -Experimental models and field studies -Experimental design -Research methods and techniques	6
4.	**Finding and evaluating sources:** -Locating, collecting and evaluating information for a specific research purpose - Acquisition of technical information - Methods of collecting information -Credible sources to make up a literature review -Up-to-date information -Relevance of sources -Validity of sources	6
5.	**Conducting research:** **-**Primary research (lab experiments and field studies) -Execution of research plan to achieve research goals	30
6.	**Formulating a research report:** **-Research report format** **-Components of a research report:** **Introduction:** Presenting the hypothesis and purpose of the project **Literature review:** Description of the publications, evaluating the existing research, and validating the research aims. **Methodology:**	8

	Application of Research methods to test hypothesis Quantitative (description and observation) Qualitative (Numerical) **Results and findings** **Analyzing and interpreting research data:** Statistical analysis of research data Interpretation of research results **Discussion:** Relating results to the research hypothesis, Explaining results Validating results by published data Significance of the research **Conclusion:** Summarizing the research report **References:** Listing of correctly cited references	
7.	**Presentation and evaluation of the research report:** -Presentation of research report (oral and written formats) -Evaluation of research report (supervisors and examiners)	4
Total		**60**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Oral presentation**	Throughout the course duration	25%
2.	**Reports**	Throughout the course duration	75%
3.	-	-	-
…	-	-	-

*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	Thomas G. (2022). How to Do Your Research Project: A Guide for Students. 3rd Ed. SAGE Publications Ltd. ISBN 10: 1529757711 Berry R. (2004). The Research Project. How to Write It, 5th Ed. ISBN 9780415334457 Ewart J, Ames K. (2020). Managing Your Academic Research Project. Springer Singapore. ISBN: 978-981-15-9194-5
Supportive References	https://www.gla.ac.uk/coursecatalogue/course/?code=BIOL513P https://ocasys.rug.nl/current/catalog/course/WBCH901-15
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratories, equipment, instruments
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	-	-
Effectiveness of students' assessment	-	-
Quality of learning resources	Supervisor (s)	Direct
The extent to which CLOs have been achieved	Department and Faculty	Direct
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

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

Course Report

(Bachelor)

Course Title:	Sustaining Natural Resources
Course Code:	EVS 1010
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (2 Lecture + 0 + 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					

4. Course General Description:

This course will highlight the proficient administration of natural resources as an essential element in addressing the difficulties associated with resource depletion and global environmental change. The primary objective of the Sustaining Natural Resources specialization is to equip students with comprehensive expertise in strategies for efficiently managing natural resources within the broader framework of sustainability concerns and environmental governance. This specialization is well-suited for individuals aspiring to pursue careers as environmental scientists and natural resource managers, as it equips them with the necessary skills and knowledge to effectively address the sustainability challenges and capitalize on the opportunities presented by the current century. The curriculum will facilitate the acquisition of knowledge and skills about the natural and social sciences that are pertinent to the administration of natural resources (NR). These acquired skills can subsequently be applied to various contexts, such as environmental conservation and sustainable resource management. The specialization focuses on hands-on and practical learning in real-world settings.

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

EVS 1110 EVS 1112

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

None

7. Course Main Objective(s):

The objective of these courses is to provide students with the necessary knowledge and abilities to effectively and responsibly handle natural resources, while also comprehending the intricate interplay among natural resources, governments, industries, and citizens. They explore sustainable alternatives for the development of oil, gas, and minerals, and analyze the significance of policy and governance in attaining sustainable results. The curriculum is tailored to cater to a diverse range of individuals, encompassing sustainable development professionals, private sector stakeholders, extractive professionals, postgraduate students, and advocates for climate change.

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Outline the fundamental concepts of sustaining natural resource**	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	**Discuss resource management issues and strategies in Saudi Arabia and international contexts**	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	**Explain the main topics on natural resource management issues and their wider environmental context**	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.4	**Explain how wealth generated from natural resource development can be used to further sustainability.**	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.5	**Identify efforts to sustainably manage extractive industry investments and Understand the complex and interwoven aspects of natural resource governance.**	K4	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	**Analyze the generated data from natural resource development**	S1	field and take-home research assignment	Lab reports and field exam
2.2	**Interpret the natural resource data and theory at a range of scales, and apply knowledge and skills in management and policy contexts**	S2	field and take-home research assignment	Lab reports and field exam
2.3	**Test the sustainable options available for oil, gas, and mineral development**	S3	field and take-home research assignment	field reports and field exam
3.0	**Values, autonomy, and responsibility**			
3.1	**Show the ability to perform assigned work independently and cooperate with a team**	V1	Lecture, field and take-home research assignment	Quizzes, midterm exams, field reports, project presentations, field exams and final exam
3.2	**Share effectively in scientific discussions and present data through different modes**	V2	Lecture, l and take-home research assignment	Quizzes, midterm exam, , project presentations

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3	**Demonstrate responsibility and follow ethical rules while performing work in the field of environmental science**	V3	Lecture, and take-home research assignment	Quizzes, midterm exam, , project presentations,

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	Introduction Natural Resources Natural Resources in Saudi Arabia Concept of Sustainability	**4**
2.	Management of natural resources sustainably Dynamics between natural resources, governments, industries, and citizens	**4**
3.	Experience of countries translating natural resource wealth into sustainable development outcomes, the necessary policies for sustainable management of natural resource wealth, and how governance of extractive industries impacts long-term economic development.	**4**
4.	The challenges and opportunities of oil, gas, and mining, the decision chain of natural resource management, the political economy of natural resources, fundamentals of oil, gas, and mining, and legal frameworks for extractive industries.	**2**
5.	The challenges and opportunities of agriculture and mining, the decision chain of natural resource management, the political economy of natural resources, fundamentals of agriculture, and mining, and legal frameworks for extractive industries	**2**
6.	The challenges and opportunities of water and mining, the decision chain of natural resource management, the political economy of natural resources, fundamentals of water, and mining, and legal frameworks for extractive industries	**2**
7.	The challenges and opportunities of solar energy and mining, the decision chain of natural resource management, the political economy of natural resources, fundamentals of solar energy, and mining, and legal frameworks for extractive industries	**2**

8.	Challenges of governance (laws and contracts, policy and planning frameworks, sound resource management, effective institutions), infrastructure (arrangements for shared platforms, corridor development),.	**2**
9.	Economic diversification (industrial policy, training, local procurement),.	**2**
10.	Environmental management (climate change resilience and adaptation,	**2**
11.	Avoidance and management of catastrophic environmental events), and economic development (community engagement, investing in development).	**2**
12.	Selected topic	**2**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	Around 5th - 6th week	20%
2.	Midterm exam 2	Around 7th - 8th week	20%
3.	Quizzes, Participation, Attendance, Presentations, Data Search	During the semester	20%
4.	Final Exam	Around 13th 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	Kathy Wilson Peacock (2008) Natural Resources and Sustainable Development forwarded by Jermy Ceral. Kethy Wilson peacock, USA. Hannah.Ferguson (2024) Earthscan Studies in Natural Resource Management, Taylor & Francis Group, USA.
Supportive References	Paul Hawken (2017) The Most Comprehensive Plan Ever Proposed to Reverse Global Warming. New York Times bestseller.USA
Electronic Materials	20 Best Sustainable Development Books of All Time - BookAuthority
Other Learning Materials	Blackboard

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and field
Technology equipment (projector, smart board, software)	Projector and Smart board
Other equipment (depending on the nature of the speciality)	-

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	**21/02/1446 H**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-154

Course Report
(Bachelor)

Course Title:	Reclamation of Arid and Impacted Lands
Course Code:	EVS 1012
Program:	Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (2 Lecture + 0 + 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					
4. Course general Description:					

This course explores the principles and practices involved in the reclamation and restoration of arid and environmentally impacted lands. Students will examine the ecological foundations necessary to understand the degradation processes and the challenges specific to arid environments. The course covers a range of topics including soil chemistry, erosion control, hydrology, native vegetation restoration, and the use of innovative technologies in land reclamation.

Through a combination of lectures, case studies, and fieldwork, students will learn about the strategies for mitigating the effects of mining, industrial activities, and unsustainable land use practices that lead to land degradation. The course will also address the policy and planning aspects of land reclamation projects, emphasizing sustainable practices and community involvement.

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

EVS 1110 EVS 1114

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

None

7. Course Main Objective(s):

The main objective of the course "Reclamation of Arid and Impacted Lands" is to equip students with the knowledge and skills necessary to effectively restore and manage arid and environmentally degraded lands. Specifically, the course aims to:

- Educate students on the ecological, chemical, and physical processes that affect arid and degraded landscapes.
- Develop critical thinking and practical skills in identifying, planning, and implementing reclamation strategies that are scientifically sound and sustainable.
- Foster an understanding of the socio-economic and policy contexts that influence land reclamation efforts, promoting an integrated approach to environmental management.

Encourage students to apply theoretical knowledge through hands-on experience in assessing, designing, and managing reclamation projects.
This objective is crafted to prepare students for professional roles in environmental science, ecology, land management, and related fields, focusing on both the scientific and practical aspects of land reclamation.
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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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Outline the ecological characteristics of arid lands: Students will gain a deep understanding of**	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	Describe the unique ecological features, biodiversity, and environmental processes that define arid regions, including how these factors influence land degradation and restoration potential.			
1.2	**Identify the causes and consequences of land degradation: Learners will identify various factors contributing to land degradation in arid and impacted environments, such as soil erosion, salinization, and the impacts of industrial activities, and understand their ecological and socio-economic implications**	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	**List the reclamation techniques and their applications: Students will understand a range of land reclamation**	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	methods, including soil amendment, erosion control, water management, and the reintroduction of native species, along with their suitability and effectiveness in different contexts			
1.4	Explain the principles of sustainable land management: Students will learn about the principles underlying sustainable practices in land management and reclamation, including the integration of environmental, economic, and social considerations in planning and decision-making	K4	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
2.0	Skills			
2.1	Evaluate and analyze the causes and impacts of land degradation in arid regions using scientific methods.	S1	Laboratory and take-home research assignment	Lab reports and Lab exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	**Interpret data from physical, chemical, and biological assessments to develop effective reclamation strategies**	S2	Laboratory and take-home research assignment	Lab reports and Lab exam
2.3	**Use of modern tools and technologies for soil analysis, hydrological assessment, and vegetation mapping. Implement erosion control techniques and soil amendment practices to restore land functionality.**	S3	Laboratory and take-home research assignment	Lab reports and Lab exam
2.4	**Plan and execute reclamation projects, from initial assessment through to monitoring and maintenance phases. Coordinate with multiple stakeholders, including government bodies, local communities, and private enterprises,**	S3	Laboratory and take-home research assignment	Lab reports and Lab exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	to ensure project success			
2.5	**Design innovative solutions to complex problems of land degradation, considering ecological sustainability and economic feasibility. Adapt reclamation methods to specific environmental conditions and project constraints**	**S4**	Laboratory and take-home research assignment	Lab reports and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate independence and collaborate with a team**	V1	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.2	**Share in specialized meetings and present data through oral presentations and written formats.**	V2	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3	**Demonstrate accountability and adhere to ethical regulations while performing a research work.**	V3	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (Lecture)	Contact Hours
1.	**Module 1: Introduction to Land Degradation and Reclamation:** - Overview of land degradation in arid regions: causes, effects, and global significance. - Introduction to the principles and goals of land reclamation.	**4**
2.	**Module 2: Ecological Foundations of Arid Lands:** - Understanding the ecology of arid environments, including flora, fauna, and ecosystem services. - Challenges unique to arid landscapes and the impact of climate change.	**4**
3.	**Module 3: Soil Science and Land Reclamation**: - Soil properties in arid lands: chemistry, fertility, and water retention. - Techniques for soil improvement and erosion control.	**4**
4.	**Module 4: Water Management in Arid Lands:** - Importance of hydrology in land reclamation. - Innovative water conservation and management techniques suitable for arid regions.	**4**
5.	**Module 5: Revegetation Strategies:** - Selection and management of plant species for successful revegetation. - Use of native vs. non-native species in restoration efforts.	**4**
6.	**Module 6: Technological Innovations in Land Reclamation:** **- Recent advancements in technology that support sustainable land reclamation.**	**2**

	- Case studies on successful technology integration in arid land restoration.	
7.	**Module 7: Legal and Policy Frameworks:** - Overview of regulatory landscapes governing land use and reclamation. - Discussion on the role of policies in promoting sustainable practices.	**2**
8.	**Module 8: Community Involvement and Socio-economic Aspects:** - Strategies for engaging local communities in reclamation projects. - Socio-economic benefits of successful land reclamation.	**2**
9.	**Module 9: Assessment and Monitoring of Reclaimed Lands:** - Methods for assessing the success of reclamation efforts. - Long-term monitoring strategies and adaptive management in land restoration.	**2**
10.	**Module 10: Case Studies and Project Planning:** - Analysis of real-world examples of successful and failed reclamation projects. - Students develop hypothetical reclamation projects, integrating knowledge from the course.	**2**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	20%
2.	Midterm exam 2	10th week	20%
3.	Quizzes, Participation, Attendance	During the semester	20%
4.	Final Exam	15th 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	• Restoration Ecology: The New Frontier" by Jelte van Andel and James Aronson. • Principles of Soil Conservation and Management" by Humberto Blanco-Canqui and Rattan Lal • Arid Land Hydrogeology: In Search of a Solution to a Threatened Resource" by A. S. Alsharhan.
Supportive References	• Journal of Environmental Management • Restoration Ecology
Electronic Materials	• USDA NRCS Web Soil Survey An online tool that provides soil data and information produced by the National Cooperative Soil Survey, useful for practical exercises and projects. • The Reclamation Library (ReclamationLibrary.com) A digital resource hosting a wide range of articles, case studies, and project reports on land reclamation.
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 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 Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/02/1446 H**

2024

TP-154

Course Report

(Bachelor)

Course Title: Foundations of Sustainable Development	
Course Code: EVS 1014	
Program: Bachelor of Science in Environmental Science	
Department: Biology	
College: Science	
Institution: Imam Mohammad Ibn Saud Islamic University	
Version: 1	
Last Revision Date: -	

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 2 (Lecture 2 + 0 + 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐ Track	
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					
4. Course general Description:					
This course provides the candidates with the concepts of sustainable development and the processes involved in conducting sustainable development. It provides students with the knowledge and skills necessary to evaluate the environmental, social, and economic impacts of development projects and to recommend sustainable practices. This interdisciplinary course offers a comprehensive exploration of sustainable development principles. It aims to equip students with an understanding of how sustainable development can be achieved in the context of various development projects and how these projects can be planned and executed with minimal environmental impact. The course delves into the concept of sustainable development, examining its historical context, theoretical underpinnings, and its practical application in various sectors. Students will explore the interplay between environmental, economic, and social pillars of sustainability, and understand how these pillars are integrated in the planning and execution of development projects. The course will also cover the legal and policy frameworks that govern sustainable development, both internationally and nationally. Throughout the course, emphasis will be placed on critical thinking, ethical considerations, and the development of practical skills necessary for conducting and evaluating environmental sustainability. Students will engage with current debates and challenges in the field, preparing them for careers in environmental planning, policy-making, consultancy, and research in both the public and private sectors.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110					
6. Co-requisites for this course (if any)**:**					
None					

7. Course Main Objective(s):

The objective of this course is to provide the students with a with a comprehensive understanding of the theoretical foundations, practical skills, and applications of Fundamentals of sustainable development. Through a combination of lectures, hands-on exercises, and projects, students will acquire various knowledge and skills.

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**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify) ……**	-
	Total	30

B. Course Learning Outcomes, Teaching Strategies, Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	**Outline the concepts of sustainable development, and methodologies used in environmental impact assessment.**		Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams
1.2	**Discuss global challenges and sustainable development goals (SDGs)**		Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.3	**Explain strategies for integrating sustainability into policy-making, planning, and decision-making processes at local, national, and international levels.**		Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	**Analyze the interconnectedness of environmental, social, and economic systems within the context of sustainable development.**		-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	**Evaluate the role of various stakeholders (government, business, civil society, etc.) in promoting or hindering sustainable development practices.**		-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	**Evaluate the equity dimensions of sustainable development efforts.**		-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	**Show independence and responsibility and cooperate effectively in a team to carry out research work in**		Group discussions	-Presentations -Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	Sustainability and resilience in project planning			
3.2	**Share in the discussion of the scientific issues and present research results via oral presentations and in written format.**		Group discussions	-Presentations -Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	**Introduction to Sustainable Development** Definition and principles of sustainable development Historical evolution and milestones	4
2.	**Sustainability Frameworks and Concepts** Triple bottom line approach (economic, social, environmental) Sustainable Development Goals (SDGs)	4
3.	**Interconnectedness of Systems** Interactions between environmental, social, and economic systems Feedback loops and resilience	4
4.	**Environmental Sustainability** Climate change and greenhouse gas emissions Biodiversity conservation and ecosystem services Sustainable resource management (water, energy, land)	4
5.	**Social Sustainability** Equity, justice, and human rights Community development and empowerment Social inclusion and diversity	4
6.	**Economic Sustainability** Circular economy principles Sustainable business practices Green finance and sustainable investment	2

7.	**Sustainable Development Policy and Governance** International agreements and protocols (e.g., Paris Agreement, Kyoto Protocol) National sustainability strategies and action plans Multi-level governance and stakeholder engagement	2
8	**Sustainable Development Challenges and Solutions** Poverty alleviation and social inequality Sustainable urbanization and infrastructure Food security and sustainable agriculture	2
9	**Sustainable Development in Practice** Case studies of successful sustainable development initiatives Best practices and lessons learned Tools and methodologies for sustainable development assessment and implementation	2
10	**Ethical and Cultural Dimensions of Sustainable Development** Ethical considerations in sustainable development decision-making Cultural perspectives on sustainability Indigenous knowledge and practices in sustainable development	2
11	**Future Trends and Opportunities** Emerging technologies for sustainability Green innovation and entrepreneurship Global trends shaping the future of sustainable development	2
12	**Group Projects and Practical Applications** Collaborative projects to address real-world sustainability challenges Field trips, guest lectures, or workshops with practitioners in sustainable development fields	2
Total		**30**

No	List of Topics	Contact Hours
1	**Water Quality Analysis** Conducting water quality tests for examples pH, turbidity, dissolved oxygen, and nutrient levels	2
2.	Water quality and pollutants Identifying pollutants and contaminants in water samples Assessing the impact of human activities on water quality	**2**
3.	**Soil Health Assessment** Analyzing various soil texture, pH, and various nutrient levels Conducting soil erosion experiments Assessing soil compaction and permeability	2
4.	**Environmental Sustainability: Climate change and greenhouse gases** Climate change and greenhouse gas emissions Evaluation of climate change and greenhouse gases Carbon monoxide, carbon dioxide, and other gases.	2
5.	**Environmental sustainability: Light and climate change Sustainability** Conducting various light quality measures e.g Ultraviolet A, UVA, Ultraviolet radiation B, UV-B, and Light quantum, PAR radiations. Assessing the light quality and sustainable development.	2
6.	**Sustainable agricultural practices** Setting up and maintaining organic vegetable gardens or aquaponics systems Monitoring soil moisture, nutrient levels, and plant growth	2
7.	**Sustainable agricultural practices 2** Monitoring nutrient levels, plant growth, photosynthetic efficiency, pigments contents. Experimenting with different agricultural techniques to improve sustainability	2
8	**Sustainable Development Challenges and Solutions** Poverty alleviation and social inequality Sustainable urbanization and infrastructure Food security and sustainable agriculture	2
9	**Waste Audit and Management** Sorting and quantifying different types of waste generated on campus or in the community	2

	Analyzing waste composition and identifying opportunities for waste reduction and recycling	
10	**Waste Audit and Management2** Analyzing waste composition and identifying opportunities for waste reduction and recycling Developing waste management plans and strategies	2
11	**Ecological Monitoring** Conducting biodiversity surveys in local ecosystems Identifying plant and animal species and recording population data Assessing ecosystem health and resilience indicators	2
12	**Group Projects and Practical Applications** Collaborative projects to address real-world sustainability challenges Field trips, guest lectures, or workshops with practitioners in sustainable development fields	2
	Total	**30**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	5th week	20%
2.	Midterm 2	10th week	20%
3.	Quizzes, Participation, Attendance, Presentations	During the semester	20%
4.	Final Exam	15th 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	• Robertson, M. (2021). Sustainability Principles and Practice (3rd ed.). Routledge. https://doi.org/10.4324/9780429346668 • Le Blanc, D. (2017). The Sustainable Development Goals: An Ambitious Agenda for the World. New York: Springer. • Stern, N. (2007). The Economics of Climate Change: The Stern Review. Cambridge: Cambridge University Press. • Raworth, K. (2017). Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist. London: Random House Business. • Ukaga, O., & Richardson, R. I. (Eds.). (2014). Sustainable Development: Principles, Frameworks, and Case Studies. New York: Routledge.
Supportive References	• IISD's EIA Online Learning Platform: This platform provides a comprehensive overview of Environmental Impact Assessment (EIA), including its history, approaches, key steps, and case studies. It is designed for EIA trainers, policy-makers, developers, and students. The content is adapted from resources published by the United Nations University, UNEP, and RMIT University, making it a valuable resource for both beginners and experienced professionals. You can explore this resource at IISD's EIA Online Learning Platform. • UNEP's Massive Open Online Courses: The United Nations Environment Programme (UNEP) offers a variety of online courses on critical environmental issues. These courses cover topics such as nature-based solutions for disaster and climate resilience, marine litter, and the Source-to-Sea approach. These courses are suitable for a wide range of audiences, including those without an environmental background. More information is available on UNEP's website. • United Nations Sustainable Development Goals (SDGs) website: Provides information on the 17 SDGs, progress reports, and resources. • World Bank Sustainable Development: Offers reports, data, and publications on sustainable development topics.

	• Intergovernmental Panel on Climate Change (IPCC): Provides authoritative assessments on climate change science, impacts, and adaptation. • Global Footprint Network: Offers tools and resources for measuring ecological footprint and promoting sustainability. • International Institute for Sustainable Development (IISD): Conducts research and analysis on sustainable development policies and practices. •
Electronic Materials	-
Other Learning Materials	-

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	-

F. Assessment of Course Quality:

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

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/02/1446 H**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-154

Course Report
(Bachelor)

Course Title:	Conservation of Wildlife
Course Code:	EVS 1016
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Muhammed Ibn Saud Islamic University
Version:	1
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (Lecture 2 + 0+ 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					
4. Course general Description:					
This course will provide students with an understanding of the science and theory of managing wildlife and habitats beginning with the fundamental needs of wildlife. The following topics will be examined: Use of natural and anthropogenic habitats by wildlife including grasslands, agricultural lands, urban environments, wetlands, and forests, direct and indirect management of wildlife including habitat management and the use of hunting and trapping to manage wildlife, exotic species and their impact on native species, the economics of wildlife and consumptive and non-consumptive uses of wildlife, and current threats to the conservation of wildlife and habitats					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1114					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
1. Improve the ability of students to read and understand scientific literature 2. Provide students with practical experience using social medial in a professional setting 3. Develop an understand of the basic needs of all species of wildlife 4. Examine the application of theory to manage wildlife and habitats 5. Further the student's understanding of wildlife ecology 6. Develop the student's ability to think critically.					

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	-
Total		30

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	Recognize the scientific, technical, and regulatory bases of wildlife management and conservation.	**K1**	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams
1.2	Describe various issues concerning wildlife conservation.	**K2**	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Outline the ongoing management protocols used in natural wildlife and their values in wildlife conservation.	**K3**	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	Apply appropriate solutions for problems related to the depletion of wildlife	**S1**	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	Inspect the management of selected wildlife populations through relevant case studies.	**S2**	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	Evaluate the application of information theory, maximum likelihood estimation, and generalized linear modelling in studying wildlife populations	**S3**	-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	Show independence in carrying out assignments and demonstrate cooperation with the work team	**V1**	Group discussions	-Presentations -Reports
3.2	Participate in scientific meetings and present data effectively	**V2**	Group discussions	-Presentations -Reports
3.2	Adhere to ethical rules while working in the field of conservation of wild life	**V3**	Group discussions	Presentations -Reports

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction, Syllabus. Introduction and History of Wildlife Conservation Perspectives and philosophical perspective; Cultural foundation; Protected Area Network (PAN)	4
2.	Wildlife–Habitat Ecology. Measuring wildlife habitat, availability, quality, animal signs; monitoring changes; corridors	4
3.	Wildlife Behavior Introduction (Group living, selfishness and altruism); evolutionarily stable strategies; concept of optimality in decision making in animals	4
4.	Ecoregions and Biomes of the World	4
5.	Endangered Species: Threats, Stressors, and Reintroduction	2
6.	Wildlife Control: Overabundant Species Overharvesting and Overexploitation	2
7.	International Trade in Wildlife	2
8.	Habitat fragmentation and landscape change, Extinctions	2
9.	Conservation Genetics and Wildlife Forensics	2
10.	Wildlife Data Collection and Management Techniques	2
11	Case studies on Wildlife Ecology and Management	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	20%
2.	Midterm exam 2	10th week	20%
3.	Quizzes, Participation, Attendance, Presentations, Data search	During the semester	20%
4.	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	Wildlife Management and Conservation: Contemporary Principles and Practices, 2013, by Paul R. Krausman et al. Wildlife Ecology and Conservation: Principles, Techniques, and Applications, 3rd Edition Conservation Biology for all. 2010. edited by Sodhi, N. S, and P. R. Ehrlich. Oxford University Press.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and laboratories
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	Environment-related instruments

F. Assessment of Course Quality

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

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Biology Department Council
REFERENCE NO.	2
DATE	21/02/1446 H

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Education & Training Evaluation Commission

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2024
TP-154

Course Report
(Bachelor)

Course Title:	Animal Behaviour and Environment
Course Code:	EVS 1018
Program:	Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (2 lectures + 0Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					
4. Course General Description:					
The course is designed to study how the animals are related to each other as well as to their environment. The activities of animals performed during their lifetime including locomotion, feeding, breeding, capture of prey, avoidance of predators, and social behaviour are also focused. The course emphasizes that animals send signals, respond to signals or stimuli, carry out maintenance behaviour, make choices, and interact with one another.					
5. Pre-requirements for this course (if any)**:**					
EVS1110 Fundamentals of Environmental Science EVS1111 Basics of Biology					
None					
7. Course Main Objective(s):					
• To define what Animal Behavior and environment mean • To identify the historical development of Animal Behavior and Environment • To know the importance of studying the subject matter of Animal Behavior and its Environment. • To acquaint students with the importance of the animal behavioural study. • To acquaint students with types of animal behaviour. • Natural and vital factors affecting the behaviour of animals.					

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**	
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

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	Explain the fundamental concepts and methodology of animal behaviour and environment.	K1	Lecture and take-home research assignment	Quizzes, midterm exams and final exam
1.2	Outline the types of animal behaviour and the scope and its function within the Environment.	K2	Lecture and take-home research assignment	Quizzes, midterm exams and final exam
1.3	Discuss the Communication between animals from different communities, and the chemical communication through Pheromones, and how to communicate with	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	each other within their original Environment.			
2.0	**Skills**			
2.1	Evaluate animal behaviour within its Environments.	S1	Laboratory and take-home research assignment	Lab reports & activity and Lab exam
2.2	Analyze behavioural data by using the appropriate statistical analytical methods	S2	Laboratory and take-home research assignment	Lab reports & activity and Lab exam
2.3	Perform research work by employing the proper methods and techniques.	S3	Laboratory and take-home research assignment	Lab reports & activity and Lab exam
3.0	**Values, autonomy, and responsibility**			
3.1	Show the ability to work in a team to conduct a specific project and solve problems.	V1	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.2	Demonstrate independence to study different kinds of animal behaviour and its interaction with the surrounding environment.	V2	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam
3.3	Participate in scientific meetings and communicate specialized data via different modes.	V3	Lecture, laboratory and take-home research assignment	Quizzes, midterm exam, Lab reports, project presentations, Lab exam and final exam

C. Course Content

No	List of Topics (Lectures)	Contact Hours
1.	Introduction to Animal Behavior and Environment	4
2.	Development of Animal Behavior	4
3.	Mechanism of Animal Behavior: Proximate and Ultimate Causes	4
4.	Animal Maturation Instinct/Learning Interactions.	4
5.	The Animal Responses to its Environment Social Behavior: Mating	2
6.	Classical Conditioning and Instrumental Conditioning	2
7.	Physiological and genetic effects on animal behavior Control of Behavior (Nervous system & Endocrine system).	2
8.	Animal Communication communication by pheromones Pattern of Sexual Behavior	4
9.	Behavioral Ecology (Habitat selection Foraging Behavior)	2
10.	Homing & Navigation Biological Clocks	2
Total		**30**

No	List of Topics (Lab)	Contact Hours
1.	Introduction to animal behavior	2
2.	Experimenting with the cockroach's behavior in cleaning its antennae	2
3.	Experimenting with the behavior of the flour beetle in choosing the appropriate environment	4
4.	Experiment with the behavior of fish in attraction to their own species	2
5.	Experimenting with the behavior of fish in attracting towards number during migration	4
6.	Experimenting with the behavior of mice walking on edges, upside down surfaces, and walls	4
7.	An experiment measuring the balance behavior of mice using an electronic spinning wheel	4
8.	Mice behavior in – Forced swim test & - Tail suspension	4
Total		**24**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	20%
2.	Midterm exam 2	10th week	20%
3.	Quizzes, Participation, Attendance, Assignments, Essays	Throughout the semester	20%
6.	Final Exam	15th 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	- Nicholas B. Davies. 2012. An Introduction to Behavioural Ecology. Wiley-Blackwell. - Shawn Nordell 2013. Animal Behavior: Concepts, Methods, and Applications. Oxford University Press.
Supportive References	- Michael D. Breed. 2015. Animal Behavior. Academic Press
Electronic Materials	• Saudi Digital Library https://www.sdl.edu.sa/SDLPortal/Publishers.aspx http://www.animalbehavior.com
Other Learning Materials	Videos, slides and presentations that are available with the instructor.

2. Required Facilities and equipment

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

Items	Resources
Technology equipment (projector, smart board, software)	Projector and smartboard
Other equipment (depending on the nature of the speciality)	Equipment related to investigation of animal behaviour

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	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/02/1446 H**

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Education & Training Evaluation Commission

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2024
TP-154

Course Report
(Bachelor)

Course Title:	**Evolutionary and Ecological Genetics**
Course Code:	**EVS 1020**
Program:	**Environmental Science**
Department:	**Biology**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**1**
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (2 Lectures + 0 Lab)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					
4. Course General Description:					
The course encompasses several aspects of evolutionary and ecological genetics focusing on case studies and data analysis. The course emphasizes the link between molecular and phenotypic analyses in the study of evolutionary processes in natural populations. A special focus is also made on linking evolutionary and ecological processes.					
5. Pre-requirements for this course (if any)**:**					
EVS 1111					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The objective of this course is to provide an integrated view, combining theoretical and experimental approaches to the study of evolution with a consideration of both pure and applied aspects of evolutionary change. There is a strong emphasis on the development of numerical skills needed for the analysis and interpretation of genetic data and a quantitative approach to the study of evolution.					

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**	
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

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	**Discuss genetic mechanisms underlying evolutionary processes**	K1	Course lectures	Quiz Midterms Final Exam
1.2	**Outline general principles in population genetics and quantitative genetics**	K2	Course lectures	Quiz Midterm Final Exam
1.3	**Identify the basic theories of phenotypic selection and adaptive evolution**	K3	Course lectures	Quiz Midterm Final Exam
1.4	**Explain how ecological and evolutionary processes interact and affect short-**	K4	Course lectures	Quiz Midterm Final Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	and long-term population viability.			
2.0	Skills			
2.1	Use genetic data to estimate population genetic parameters and determine relatedness and individual fitness	S1	Course lectures	Quiz Midterm Final Exam
2.2	Estimate strength and direction of phenotypic selection and predict rate of evolution - Analyze relatedness and molecular genetic data to determine the genetic basis for ecologically important phenotypic traits	S2	Course lectures	Lab Midterm Final Exam
2.3	Evaluate critically, interpret and judge results from studies at the intersection of evolution, genetics and ecology	S3	Course lectures	Lab Midterm Final Exam
2.4	Plan studies in evolutionary and ecological genetics.	S4	Course lectures	Lab Midterm Final Exam
3.0	Values, autonomy, and responsibility			
3.1	Evaluate the importance of genetic and ecological processes for evolution in natural populations	V1	Discussion	Performance Evaluation
3.2	Judge and reflect on primary literature in evolutionary and ecological genetics	V2	Discussion	Performance Evaluation
3.3	Show the ability to present results from quantitative studies through different modes	V3	Discussion	Performance Evaluation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.4	**Demonstrate the ability to work independently and cooperate with team.**	V4	Discussion	Performance Evaluation

C. Course Content

No	List of Topics	Contact Hours
1.	**Foundations:** Introduction to Population Genetics, elements of population genetics, Genetic variation, Characterization of DNA sequence variations, Gene Pool of a Population (Allelic frequencies, phenotypic frequencies, genotypic frequencies)	8
2.	**Hardy-Weinberg Law** Genotypic Frequencies at Hardy–Weinberg Equilibrium Closer Examination of the Assumptions of the Hardy–Weinberg Law Implications of the Hardy–Weinberg Law Extensions of the Hardy–Weinberg Law Testing for Hardy–Weinberg Proportions Estimating Allelic Frequencies with the Hardy–Weinberg Law	8
3.	**Genetic Variation in Populations and their Analysis** Nonrandom Mating Evolutionary Forces: mutations, genetic recombination, gene flow or gene migration, genetic drift, natural selection,	4
4.	**Evolutionary Genetics** Natural Populations and Genetic Variation New Species and Reproductive Isolation Evolutionary History and Homologous Characteristics Patterns of Evolution Evolution of Sex Multi-locus evolution: Adaptive landscape, Spatial variation, Temporal variation	2
5.	**Quantitative Genetics** Quantitative Characteristics Variation Quantitative Characteristics and Statistical Methods Heritability and Genetic variation Genetically Variable Traits and Selection	2
6.	**Ecological genetics** Inbreeding depression and mating systems: Evolution of selfing rate, Modifier models, Breeding system evolution	2
7.	**Population substructure** F statistics. migration Hierarchical F, derived from coalescent theory Likelihood, Bayesian statistics	4
Total		**30**

No	List of Topics (labs)	Contact Hours
1.	**Gene Pool of a Population** (Allelic frequencies, phenotypic frequencies, genotypic frequencies)	4
2.	**Hardy-Weinberg Law**	4
3.	**Genetic Variation in Populations and their Analysis**	4
4.	**Evolutionary Genetics:** The Alignment of Homologous Sequences The Construction of Phylogenetic Trees	4
5.	**Quantitative Genetics** Measuring natural selection G-matrix QTL simplified Heritability and Genetic variation	4
6.	**Population substructure** F statistics. migration Hierarchical F, derived from coalescent theory Likelihood, Bayesian statistics	4
	Total	**24**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	20%
2.	Midterm exam 2	10th week	20%
3.	Quizzes, Participation, Attendance	During the semester	20%
6.	Final Exam	15th 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	-Benjamin A Pierce (2020) Genetics: a conceptual approach. 7th edition W.H. Freeman. ISBN-13-978-1319216801.
Supportive References	
Electronic Materials	• Saudi Digital Library https://www.sdl.edu.sa/SDLPortal/Publishers.aspx http://www.animalbehavior.com
Other Learning Materials	

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 speciality)	Genetics-related equipment

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	**21/02/1446 H**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-154

Course Report
(Bachelor)

Course Title:	Industrial Waste and Carbon Emissions
Course Code:	EVS 1022
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 2 (Lecture 2 + Lab 2)

2. Course type

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

3. Level/year at which this course is offered: (Not determined)

4. Course General Description:

This course deals with the basic concepts of industrial waste and its waste generated during industrial processes, manufacturing, or production activities. It includes solid waste, hazardous materials, and wastewater. An integrated approach to reducing carbon emissions in industrial clusters, including systemic efficiency, circularity, direct electrification, renewable heat, and hydrogen solutions.

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

EVS 1110 EVS 1114

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

None

7. Course Main Objective(s):

To management waste and its emissions processes: carbon dioxide emission processes and non-carbon dioxide emissions (such as methane and nitrous oxide) from the waste sector.

Monitoring industrial waste, operating treatment processes, maintaining equipment, and applying instrumentation and control strategies

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**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify) ……**	
	Total	30

B. Course Learning Outcomes, Teaching Strategies, Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe methods to estimate greenhouse gas emissions from different waste handling practices, including solid waste disposal sites, domestic wastewater, industrial wastewater, and waste incineration)	**K1**	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	Define and apply current remediation processes and technologies for waste management and inform communities and stakeholders about the best practices in waste management	K2	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.3	Explain an integrated approach to reducing carbon emissions in industrial clusters, including systemic efficiency, circularity, direct electrification, renewable heat, and hydrogen solutions.	S3	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	Compare, interpret and predict the different biological methods and their applications in various biological industries	S1	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	Interpret and Valorization of Industrial Wastes , Focus on minimizing waste generation, promoting reuse, recycling materials, and exploring waste valorization processes and technologies	S2	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	Demonstrate the ability to select the criteria of treatment technologies and site remediation	S3, S4	-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	Share in scientific discussions and prepare the scientific reports related to applied waste management	**V1**	Group discussions	-Presentations -Reports
3.2	Demonstrate the ability to organize and collect data and present it through different modes to a varied audience	**V2**	Group discussions	-Presentations -Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	Definition: Industrial waste	4
2.	Types of Industrial Waste: Solid Waste: This includes materials like packaging, scrap metal, plastics, and other non-liquid waste.	4
3.	Hazardous Waste: These are materials that pose a risk to human health or the environment. Examples include chemicals, heavy metals, and radioactive substances.	4
4.	Wastewater: Generated from industrial processes, it contains pollutants and requires treatment before disposal.	4
5.	Management Strategies: Reduce: Minimize waste generation through efficient processes and resource optimization. Reuse: Find ways to reuse materials within the industry.	4
6.	Reuse: Find ways to reuse materials within the industry. Recycle: Recycle materials like paper, glass, and metals. Dispose: Properly manage and dispose of waste according to regulations.	2
7.	Definition: Carbon emissions refer to the release of carbon dioxide (CO_2) and other greenhouse gases (GHGs) into the atmosphere.	2
8	Sources of Carbon Emissions: Fossil Fuel Combustion: Burning coal, oil, and natural gas for energy production. Transportation: Cars, trucks, planes, and ships emit CO_2 during fuel combustion. Industrial Processes: Manufacturing, cement production, and chemical industries contribute. Deforestation: Trees absorb CO_2; their removal releases it.	2
9	Mitigation Strategies: Renewable Energy: Transition to clean energy sources like solar and wind. Energy Efficiency: Improve industrial processes and reduce energy consumption.	2
10	Carbon Capture and Storage (CCS): Capture CO_2 emissions and store them underground. Afforestation: Plant trees to absorb CO_2.	2
	Total	**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	20%
2.	Midterm exam 2	10th week	20%
3.	Quizzes, Participation, Attendance	During the semester	20%
6.	Final Exam	15th 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	• Industrial Waste Treatment Handbook" by Woodard & Curran Inc. "Carbon Emissions in the Industrial Sector" by J. Smith & R. Green. • Reducing Carbon Emissions in Manufacturing: Case Studies from Automotive Industry" by B. Lee & C. Chen.
Supportive References	WWW.United Nations Environment Programme (UNEP): Provides information on waste management and emissions reduction strategies.
Electronic Materials	https://link. Intergovernmental Panel on Climate Change (IPCC): Reports on carbon emissions and climate change mitigation.
Other Learning Materials	Lectures material available in Black Board platform

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom**
Technology equipment (Projector, smart board, software)	**Projector, smart board**
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

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

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/02/1446 H**

2024

TP-154

Course Report

(Bachelor)

Course Title:	Global Climate Change
Course Code:	EVS 1024
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (2 Lecture + 0 + 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					
4. Course general Description:					
This course will describe the science of global warming and its forecast for humans' impact on Earth. Climate change is one of the most profound environmental and social issues affecting communities, nations and individuals. This course is an introduction to this global challenge, including its scientific underpinnings, history, potential impacts on natural systems and human societies around the world, and two societal responses: adaptation and greenhouse gas mitigation. Opportunities to develop sustainable resilient communities, as well as Saudi Arabia's climate change policy responses, will be highlighted.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110 EVS 1114					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The objective of these courses is to provide students of any discipline with the climate change: both biophysical and human dimensions. Climate change is a pervasive and challenging phenomenon that can be viewed through a multitude of lenses. A scientific lens, for instance, reveals altered ecosystems and climatic tipping points while the lens of ethics raises the question of the right to develop and influence the well-being of others while doing so. By carefully laying the scientific foundations, we will explore creative, positive, nuanced visions of the future that are rooted in scientific understanding of earth					

systems but also capture (or at least begin a conversation about) core human values, such as equity, compassion, innovation, and connection. A wider variety of actors are increasingly taking action on climate change, or bearing some responsibility for doing so, allowing us to analyze coordinated, effective responses that go beyond international negotiations. This course is intended for undergraduate students of all backgrounds (arts, social sciences, and sciences) who wish to explore the biophysical and human dimensions of climate change. The course will also help students to hone their abilities to communicate potential solutions to others.

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)(** home research assignment and presentations)	0
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Discuss comprehensively and understand of key elements of the climate system, and how these elements are being altered by the human emission of greenhouse gases.**	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	**Explain the impacts of climate change on both human and natural systems.**	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	**Clarify the difference between climate change adaptation and mitigation, and understand a portfolio of actions that communities can take to respond to climate change.**	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.4	**Outline the key issues at play in international climate change negotiations, as well as recent KSA policy proposals.**	K4	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	**Relate between the different practices and be aware of the challenges in detecting unusual global warming signals amidst natural climate variability.**	S1	home research assignment	reports
2.2	**Evaluate the appropriate theory and methods to sustainability**	S2	take-home research assignment	reports
2.3	**Analyze the knowledge, information, and research skills to solve problems related to climate change**	S3	take-home research assignment	reports
2.4	**Perform the relationship between water, climate change, and the adaptation of living organisms, nutrition, cultivation, adaptation strategies, risks, and potential threat**	S4		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	**Demonstrate critical and creative thinking skills.**	V1	Lecture and take-home research assignment	Quizzes, midterm exams, reports, project presentations
3.2	**Participate between the three approaches to achieve sustainability**	V2	Lecture, and take-home research assignment	Quizzes, midterm exam, , project presentations,
3.3	**Adhere to the relevant ethical rules on specific problems using scientific evidence to support their position to an audience of peers.**	V3	Lecture, and take-home research assignment	Quizzes, midterm exam, , project presentations,

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	Introduction of climate change • Introduction to the debate • Format and approach of class • Learning objectives, syllabus, schedule • The media, climate change communication, and recent trends	4
2.	INTRODUCTION TO THE CLIMATE SYSTEM • What is a system? • System dynamics • Components of the climate system	4
3.	THE EARTH AND ENERGY • Energy basics • Ins and Outs; Forcings • Reflectivity and aerosols • The Greenhouse Effect.	4

4.	THE CARBON CYCLE • Carbon stocks and flows • Forcings • Emissions scenarios.	2
5.	PAST AND FUTURE CLIMATE • Future climate, scenarios and projections	2
6.	Impacts on natural systems • Aquatic system • Terrestrial systems	2
7.	: Impacts on humans • Introduction • Developing countries • Cities	2
8.	ASSESSING VULNERABILITY • Impact and vulnerability analyses • Equity, ethics, responsibility • Urban vulnerability	2
9.	ADAPTATION • What is adaptation? Reactive, proactive • Options and progress • Developing country contex	2
10.	INTRODUCTION TO MITIGATION • Sources of emissions • Demand-side mitigation • Supply-side mitigation	2
11.	POLICY, GOVERNANCE and POLITICS • Governing climate change: actors, interests, challenges • The UNFCCC • Kyoto and Paris	2
12.	SUSTAINABILITY TRANSFORMATIONS: LINKING ADAPTATION AND MITIGATION IN COMMUNITIES • A/M/SD synergies • Accelerating innovation • Envisioning the future	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	15%
2.	Midterm exam 2	10th week	15%
3.	Quizzes, Participation, Attendance	During the semester	10%
4.	Discussion Forum: Summary assignments plus the number of posts	During the semester	5%
5.	Assignment 1: Impacts and Adaptation Assignment 2: Mitigation	Around 9th week	15%
6.	Final Exam	15th 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	Required textbook: Burch, Sarah and Sara Harris. 2014. Understanding Climate Change: Science, Policy and Practice. Toronto: University of Toronto Press. Adger, W. N., J. Paavola, S. Huq, and M. J. Mace (eds.). 2006. Fairness in Adaptation to Climate Change. Cambridge, MA: MIT Press. Adger, W. N., S. Agrawala, M. M. Q. Mirza, C. Conde, K. L. O'Brien, J. Pulhin, R. Pulwarty, B. Smit, and K. Takahashi. 2007. Assessment of adaptation practices, options, constraints, and capacity. In Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M. L. Parry, O. F. Canziani, J. P. Palutikof, C. E. Hanson, and P. J. Van Der Linden (eds.). Cambridge: Cambridge University Press.
Supportive References	Adams, P. N., and D. L. Inman. 2009. Climate Change and Potential Hotspots of Coastal Erosion Along the Southern California Coast—Final Report. CEC-500-2009-022-F, Sacramento, California Energy Commission.
Electronic Materials	https://nap.nationalacademies.org/read/12782/chapter/22
Other Learning Materials	Black board

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Projector and Smart board
Other equipment (depending on the nature of the specialty)	-

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	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/02/1446 H**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
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NCAAA

2024

TP-154

Course Report

(Bachelor)

Course Title:	Environmental Economics
Course Code:	EVS 1026
Program:	Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 2 (Lecture 2+ 0+ 0)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Not determined)					
4. Course General Description:					
This module aims to provide you with an introduction to and an overview of environmental economics. The objective of the course is to show how economic analysis can help identify the causes of environmental degradation and the policy measures to deal with environmental problems.					
5. Pre-requirements for this course (if any)**:**					
EVS 1110					
None					
7. Course Main Objective(s):					

- understand the emergence of environmental concerns in economics.
- explain various models of economy-environment interdependence.
- understand basic economic concepts and tools used in the analysis of environmental problems;
- outline the process of doing a cost-benefit analysis, have a clear understanding of the problems in using cost-benefit analysis for environmental management.
- provide an overview of various concepts of value, the economic rationale for the monetary valuation of the environment and an understanding of valuation methods.
- understand the various policy instruments used in environmental management and how to choose among them in the political context.
- provide an economic analysis for ecosystem services, air pollution, water pollution or solid waste.
- explain the relationship between economic growth, energy, and the environment.

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**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Method

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Clarify the emergence of environmental concerns in economics	K1	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.2	Explain various models of economy-environment interdependence.	K2	Lecture and take-home research assignment	Quizzes, midterm exam and final exam
1.3	Outline the basic economic concepts and tools used in the analysis of environmental problems	K3	Lecture and take-home research assignment	Quizzes, midterm exam and final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Relate between the various concepts of value, the economic rationale for the monetary valuation of the environment and the valuation methods	S1	take-home research assignment	activity and exam
2.2	Perform the cost-benefit analysis, and show a clear understanding of the problems in using cost-benefit analysis for environmental management.	S2	take-home research assignment	activity and exam
2.3	Use computers and the internet to analyze the economy-environment interdependence.	S3	take-home research assignment	activity and exam
3.0	**Values, autonomy, and responsibility**			
3.1	Show independence and responsibility and cooperate effectively in a team to carry out research work	V1	Group discussions	-Presentations -Reports
3.2	Share in the discussion of scientific issues and present research results via oral presentations and in written format.	V2	Group discussions	-Presentations -Reports

C. Course Content

No	List of Topics (lectures)	Contact Hours
1.	History and ethics of economic approaches to environmental management and policy	4
2.	Economy-environment relationships	4
3.	Basic economic concepts and tools	4
4.	Economic analysis	4
5.	Economic valuation of environmental benefits	4
6.	Economic approaches to environmental policy	4
7.	Economics of biodiversity loss and ecosystem services	2
8.	Economics of pollution and waste	2
9.	Green Economics	2
	Total	**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	15%
2.	Midterm exam 2	10th week	15%
3.	Quizzes, Participation, Attendance	During the semester	10%
4.	Research assignment	During the semester	20%
5.	Final Exam	16 th 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	Tietenberg & Lewis, 2009. Environmental and Natural Resource Economics. 9th edition
Supportive References	Goulder & Parry, 2008. Instrument Choice in Environmental Policy. Review of Environmental Economics and Policy, 2(2): 152-174. 2. Shortle, J. 2013. Economics and Environmental Markets: Lessons from Water-Quality Trading. *Agricultural and Resource Economics Review*, 42(1): 57-74
Electronic Materials	• Saudi Digital Library https://www.sdl.edu.sa/SDLPortal/Publishers.aspx
Other Learning Materials	Videos, slides and presentations

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 speciality)	-

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 Leaders	Direct
Other	-	-

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/02/1446 H**