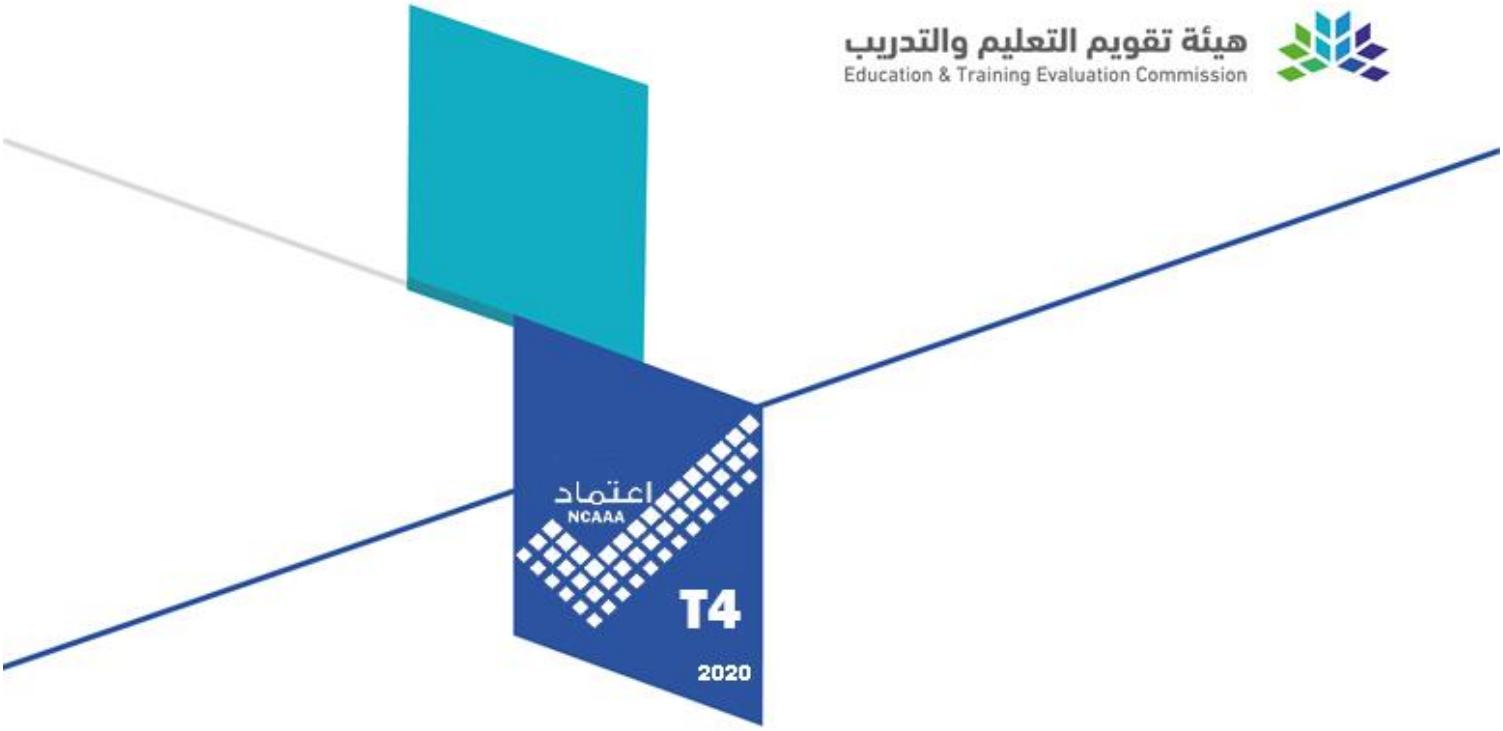
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Air and water pollution 2**
Course Code:	
Program:	Environmental Science
Department:	Chemistry
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:	3 (2 theoretical + 1 practical)
2. Course type	
a.	University ☐ College ☐ Department ■ Others ☐
b.	Required ■ Elective ☐
3. Level/year at which this course is offered:	**7th level/3rd year**
4. Pre-requisites for this course (if any)**: Instrumental Chemical Analysis**	
5. Co-requisites for this course (if any)**:**	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others** (specify)	6
	Total	56

B. Course Objectives and Learning Outcomes

1. Course Description

This course concerns about the importance of air and water, their composition, possible pollutants, chemical methods used for the determination of these pollutants and the purification methods.

2. Course Main Objective

By the end of this course student have all information about the pollutants of air and water, their sampling, measurements and purification methods.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Know different water sources, quality control and data handling in analytical chemistry techniques and how to select the optimum samples	K2

CLOs		Aligned PLOs
1.2	Recognize the industrial pollutions present in water	K3
1.3	Describe analytical chemistry in manufactures and found way for purification and corrosion control	K3
2	**Skills :**	
2.1	Develop the reverse think skills and predict the suitable methods for industrial pollutants separation from water samples	S2
2.2	Explain the methods and ways of analytical chemistry – environmental analytical chemistry to remove industrial pollutions	S3
2.3	Explain the suitable method to determine the organic and inorganic pollutants in different water samples	S2
3	**Values:**	
3.1	Write and present a chemical report and solve problems related to spectrophotometric, electrochemical, chromatographic and spectrocopic analysis of air and water.	V4
3.2	Work collaboratively and constructively in teams with responsibility to perform a specific experiment or preparing a report on the spectrophotometric, electrochemical, chromatographic, spectroscopic X-ray, Raman and FT-IR processes.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction, importance of water, water sources.	2
2	Parameters used for evaluating water quality.	2
3	Water pollution and pollutants	2
4	Water analysis methods	2
5	Sewage water and its analysis	2
6	Water treatments	2
7	Air. Its composition, air pollution [Types, sources, impacts on health and environment, smog, acid rain and global warming].	2
8	Volatile organic compounds, VOCs	2
9	Air sampling methods.	2
10	Determination methods of carbon oxides, sulfur dioxide, nitrogen oxides, particulate matter and hydrocarbons from the atmosphere.	2
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Know different water sources, quality control and data handling in analytical chemistry techniques and how to select the optimum samples	Lectures and Scientific discussion	Quiz
1.2	Recognize the industrial pollutions	Lectures and Scientific	Quiz and Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	present in water	discussion	
1.3	Describe analytical chemistry in manufactures and found way for purification control	Lectures and Scientific discussion	Quiz and Exam
2.0	**Skills**		
2.1	Develop the reverse think skills and predict the suitable methods for industrial pollutants separation from water samples	Lectures and short essays	Lab exam
2.2	Explain the methods and ways of analytical chemistry – environmental analytical chemistry to remove industrial pollutions	Lectures Lab work Scientific discussion	Lab exam Mid-term and Final exams
2.3	Explain the suitable method to determine the organic and inorganic pollutants in different water samples	Lab work. Scientific discussion	Lab exam Final exam
3.0	**Values**		
3.1	Write and present a chemical report and solve problems related to spectrophotometric, electrochemical, chromatographic and spectrocopic analysis of air and water.	Class discussion and research activity	Overall student performance in Lab.
3.2	Work collaboratively and constructively in teams with responsibility to perform a specific experiment or preparing a report on the spectrophotometric, electrochemical, chromatographic, spectrocopic x-ray, Raman and FT-IR processes.	Class discussion and research activity	Cross questions after finishing laboratory work

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	--	10 %
2	Midterm Exam.	7	20 %
3	Practical Exam.	13	30 %
4	Final Exam. (2hours Exam)	14	40 %
5	**Total**		100%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- We have faculty members to provide counselling and academic advice.
- 2 hours per week as office hours are available for discussion with the students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Riley Mitchell & Felix Sweeney, ***Air pollution***, 7th edition, ED-Tech Press (2018) • Humaira Qadri ،Rouf Ahmad Bhat, Mohammad Aneesul Mehmood ،Gowhar Hamid Dar, ***Fresh water pollution Dynamics and remediation***, Springer (2020) • C. David Cooper, F. C. Alley. ***Air pollution control; a design approach*** (2017) 4th, Waveland Press.
Essential References Materials	Lecture hand outs available on the coordinator website
Electronic Materials	• **http://www.chemweb.com** • **http://www.sciencedirect.com** • **http://www.rsc.org**
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms capacity (30) students. • Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Room equipped with computer and projector and TV
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• No other requirements.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty Indirect (feedback from faculty and students).
Quality of learning resources	Students	Direct (feedback from faculty). Indirect (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	30 – 3 - 2022

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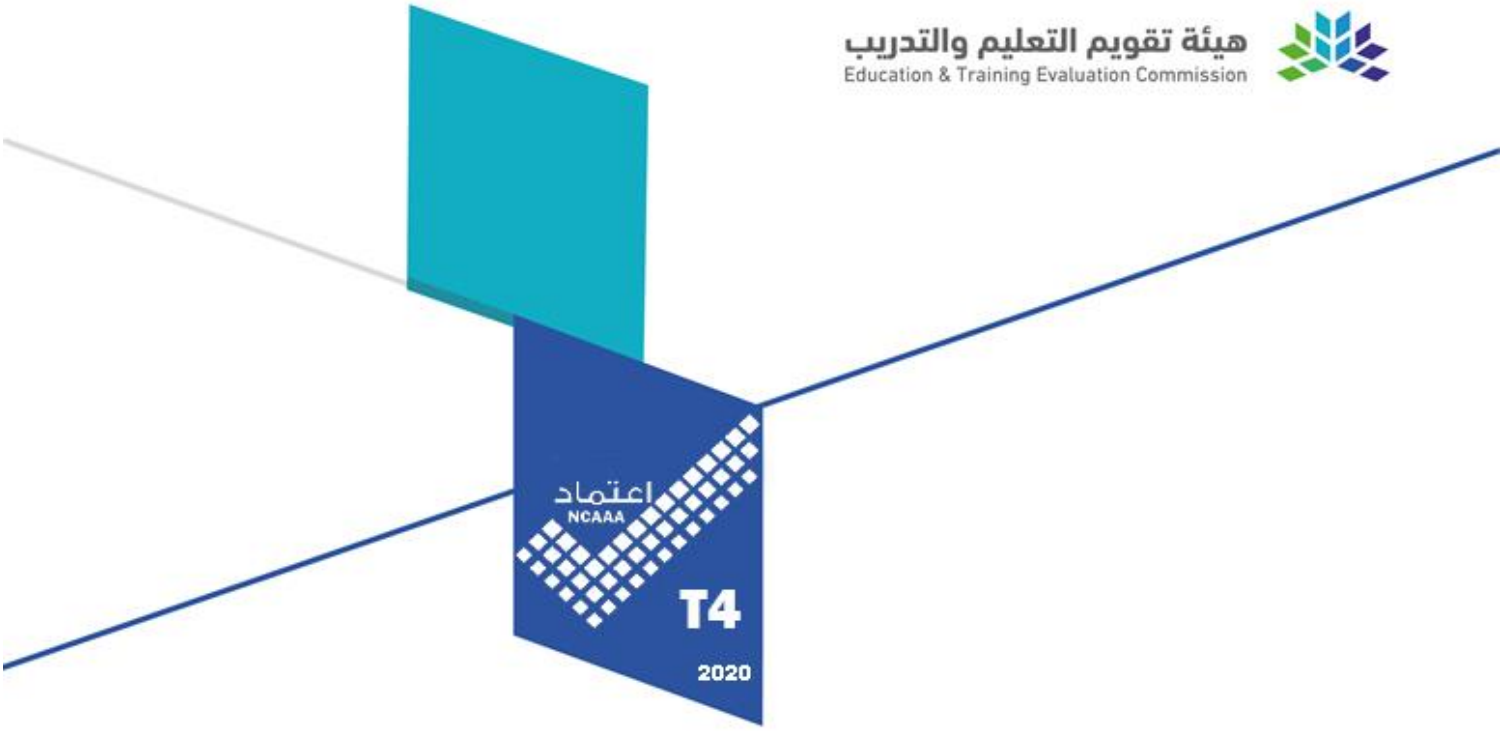
Education & Training Evaluation Commission



Course Specifications

Course Title:	Biochemistry
Course Code:	3hrs/ Week (2Lec/1Lab)
Program:	Environmental Science
Department:	Biology Department
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 3th year/Level 5
4. Pre-requisites for this course (if any)**: Fundamentals of organic chemistry**
5. Co-requisites for this course (if any)**: N/A**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		80 %
2	**Blended**		
3	**E-learning**		10 %
4	**Distance learning**		10 %
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h
2	**Laboratory/Studio**	30 h
3	**Tutorial**	
4	**Others** (specify)	
	Total	50 h

B. Course Objectives and Learning Outcomes

1. Course Description

The major goal is to understand the basic biochemical properties of biomolecules and the relationship between structure and function. This course covering the fundamentals of biochemistry. Topics covered include: the structure and function of important biomolecules such as carbohydrates, lipids, amino acids, proteins and nucleic acids; enzyme kinetics and the use of cofactors & coenzymes; and metabolic pathways including glycolysis, TCA, electron-transport system, fatty acid and amino acid pathways. Laboratory work includes current biochemical laboratory techniques such as chromatography and electrophoresis, application of specific topics described above, and analysis of data from laboratory experiments.

2. Course Main Objective

- Provide students with information needed to understand the essential topics of biochemistry, including the structure of micro and macromolecules.
- Compare and contrast the chemical, structural differences between biomolecules.

- Develop student's ability to learn and understand the structure, function relationship of biomolecules.
- Apply the processes of scientific research and experimental design to the diversity of biomolecules in living cells.
- Describe how biomolecules control every aspect of the cell function.
- Develop the skills of students to laboratory techniques, investigation, and identification of Biochemical compounds

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize knowledge and basic information of biochemistry and the relationships between biomolecules structure and their functions.	**K1**
1.2	To describe the role of biomolecules in living cells and differentiate between biomolecules and their structures and functions.	**K1**
1.3	Understanding the concept of biochemical metabolism and their cycles in live model	**K3**
2	**Skills:**	
2.1	To Summarize most of the biochemical data (Carb, protein, lipids, enzymes, nucleic acids) and their importance.	**S1**
2.2	To evaluate the interrelationships between biomolecules	**S1**
2.3	To interpret the relation between the biomolecule's abnormalities and health.	**S2**
2.4	Differentiate between healthy and unhealthy biomolecules in food.	**S4**
3	**Values:**	
3.1	Appraise their time in self-study of the course materials (homework, conducted research)	**V1**
3.2	Analyze, write and exchange the data.	**V2**
3.3	Working in teamwork.	**V3**

C. Course Content

No	List of Topics	Contact Hours
1	General introduction of the meaning of biochemistry and its importance.	2
2	The structure, classification and functions of Carbohydrates and the metabolism cycle	4
3	The structure, classification and functions of protein and the metabolism cycle of exceed amino acids	4
4	The structure, classification and functions of lipids and the metabolism cycle of fatty acids	4
5	The structure, classification and functions of enzymes.	4
6	The structure, classification and functions of vitamins and their importance	2
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize knowledge and basic information of biochemistry and the relationships between biomolecules structure and their functions.	• Classroom lecturing • Homework assignments • Discussions (connecting what they learn in the class. • Handout of lecture notes for each topic • Small group discussions.	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports • Oral presentation
1.2	To describe the role of biomolecules in living cells and differentiate between biomolecules.		
1.3	To Recall and differentiate between biomolecules.		
1.4	To define the levels of protein and nucleic acid structures.		
1.5	Understanding the concept of biochemical metabolism and their cycles		
2.0	**Skills**		
2.1	To Summarize most of the biochemical data (Carb, protein, lipids, enzymes, nucleic acids, vitamins) and their importance.	• Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). • Homework assignments	
2.2	To evaluate the interrelationships between biomolecules		
2.3	To interpret the relation between the biomolecule's abnormalities and health.		
2.4	Differentiate between healthy and unhealthy biomolecules in food.		
3.0	**Values**		
3.1	To be able to evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.		• Assignments (Individual or in groups) • Presentation (Individual or in groups) to evaluate the knowledge of understanding. • Research search assignments.
3.2	Learn continuously through self-study and or experience to recognize the value of learning.		
3.3	Work collaboratively and effectively in teams		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation & open discussion	Weekly	10
2	Mid-term Exam (written exam)	5th	20
3	Mid-term Exam (lab part)	5th	10
4	Final Exam (written exam)	11-12th	40
5	Final Lab Exam (written exam)	111-12th	20

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Faculty members must be available for academic counseling and support.
- Laboratory assistance.
- E-mail communications.
- Private tutorial.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Biochemistry, David Hames & Nigel Hooper 3th edition, Taylor & Francis group. Lippincott's Illustrated Reviews: Biochemistry, Denise R. Ferrier, 6th edition, Wolters Kluwer business.
Essential References Materials	www.google.com
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Library.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakness areas and lack of understanding	Department/Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader Head of the Department Quality Committee	Annual Program Report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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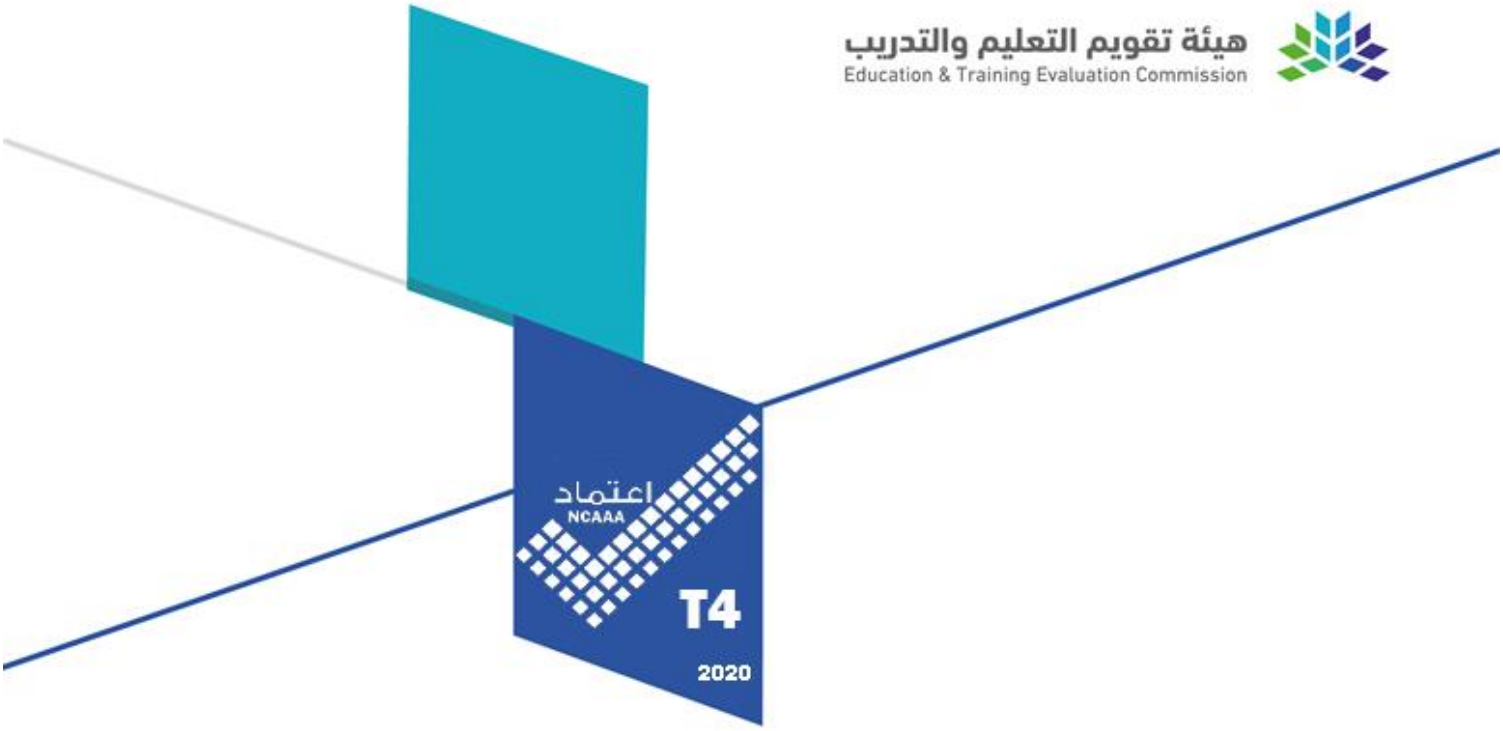
Education & Training Evaluation Commission



Course Specifications

Course Title:	Biodiversity and Conservation Biology
Course Code:	
Program:	Environmental Science
Department:	Biology Department
College:	Faculty of science
Institution:	Umm Al-Qura University

Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: 11 level, fourth year
4. Pre-requisites for this course (if any)**:** Natural resource management and environmental protection
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		80 %
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		20 %

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	22
2	**Laboratory/Studio**	16
3	**Tutorial**	
4	**Others** (specify) self-learning – field trips	10
	Total	48

B. Course Objectives and Learning Outcomes

1. Course Description

Biodiversity and Conservation Biology course provides an introduction to conservation and biodiversity principles. This course discusses the issue of biodiversity loss and conservation strategies. It also includes training sessions on utilizing the IUCN Species Red List criteria. Topics will be investigated from a local, regional, and global standpoint.

2. Course Main Objective

This course aims to provide students with knowledge of biodiversity and the essentials of conservation biology

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Understand what is meant by biodiversity and its value.	K1
1.2	Outline the main reasons for decline and threats to biodiversity locally, regionally, and globally.	K1
1.3	Recall the basic concepts of conservation practices.	K3
1...		
2	**Skills :**	
2.1	Interpretation conservation priorities	S2
2.2	Apply the IUCN Species Red List categories and criteria.	S3
2.3	Analyze the range of options for biodiversity conservation	S2
2...		
3	**Values:**	
3.1	Improve communication skills (orally)	V1
3.2	Work independently and as part of a team to finish some assignments.	V3
3.3	Computer skills and e-learning interaction	V4

C. Course Content

No	List of Topics (lectures)	Contact Hours
1	Biodiversity: concept, the value of biodiversity, biodiversity informatics	2
2	Biodiversity levels: genetic diversity, species diversity and habitats diversity; measuring biological diversity	2
3	Extinction: extinction rate, vulnerability to extinction, IUCN Red list categories and criteria; endemic species	2
4	Causes of species extinctions and biodiversity degradation: habitat destruction, fragmentation and degradation, overexploitation, exotic species and disease	2
5	Problems of small population, monitoring of population, establishing new population	2
6	Conservation biology: concept, historical overview *Ex-situ* conservation strategies: (genetic resources, seed banks, botanical gardens, zoos, aquaria)	2
7	*In-situ* conservation strategies: protected area types, establishing priorities, international approaches (hot spot areas, wilderness areas, centers of diversity)	2
8	Designing protected areas	2
9	Managing protected areas	2
10	Habitat restoration, international approach to conservation and sustainable development	2
Total		22

No	List of Topics (lab)	Contact Hours
1	An introduction to the IUCN Red List, the Red List assessment process and role of the Red List Assessor, Terms used in the Red List Criteria,	2
2	Using GeoCAT software to determine EOO &EOO, Red List Categories, Data Quality & Uncertainty	2
3	Red List Criteria: criterion A	2
4	Red List Criteria: criterion B	2
5	Red List Criteria: criteria C, D & E	2
6	Selecting the Final Red List Category & Criteria, Red List Mapping standards, using ArcGIS online.	2
7	Using the Red List Criteria for regional Red Lists: How to Add the Regional Dimension, The importance of regional Red Lists, Using the IUCN Red List Categories & Criteria for regional assessments	2
8	Supporting Information for Red List assessments, Data Storage – IUCN Species Information Service (SIS)	2
Total		16

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Understand what is meant by biodiversity and its value.	Lecture Open discussion. PowerPoint presentation, Documentary	Quizzes. Midterm exam. Final exam.
1.2	Outline the main reasons for decline and threats to biodiversity locally, regionally, and globally.		
1.3	Recall the basic concepts of conservation practices.		
2.0	**Skills**		
2.1	Interpretation conservation priorities	Problem-based learning. Group activities practical lessons	Oral quiz. Worksheets
2.2	Apply the IUCN Species Red List categories and criteria.		
2.3	Analyze the range of options for biodiversity conservation		
3.0	**Values**		
3.1	Improve communication skills (orally)	Oral presentations. Group learning Assignments Self- learning.	Evaluation of student essays and assignments. Open discussion.
3.2	Work independently and as part of a team to finish some assignments.		
3.3	Computer skills and e-learning interaction		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Speech and discussion; Worksheets	Continuous	5 %
2	Quizzes	Continuous	10 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Med term exam	7	15 %
4	Group project	10	10 %
5	Final exam "Practical Test"	11	20 %
6	Final Exam Written Test	13	40 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Office hours 6 hours per week distributed over the week days.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Primack RB (2010) Essentials of Conservation Biology. Oxford University Press. (Arabic translation is available) Lab sessions: https://www.dropbox.com/sh/etz4hmluotfjhlk/AADRS_JyFbk78WxUHQ-FdEFHa?dl=0 IUCN (2012) Guidelines for application of IUCN red list criteria at regional and national levels: version 4.0. IUCN Gland, Switzerland and Cambridge, UK (Arabic translation is available)
Essential References Materials	Gadelha LMR et al. (2021) A survey of biodiversity informatics: Concepts, practices, and challenges WIREs Data Mining and Knowledge Discovery 11 doi:10.1002/widm.1394 Abuzinada AH, Al-Wetaid Y, Al-Basyouni SZM (2005) The National Strategy for Conservation of Biodiversity in the Kingdom of Saudi Arabia. The National Commission for Wildlife Conservation Development. Conservation of Biological Diversity, Riyadh, Saudi Arabia Abuzinada AH, Robinson E, Nader I, Al Wetaid Y (2001) First Saudi Arabian National Report on the Convention on Biological Diversity. The National Commission for Wildlife Conservation and Development, Riyadh, Kingdom of Saudi Arabia
Electronic Materials	• Convention on Biological Diversity (CBD) https://www.cbd.int/ • International Union for the Conservation of Nature (IUCN) https://www.iucn.org/ • Conservation International https://www.conservation.org/ • National Center of Wildlife (NCW) https://www.ncw.gov.sa/ • Biodiversity informatics training curriculum (YouTube channel) https://www.youtube.com/user/rosaytown/featured
Other Learning Materials	Conservation Training https://www.conservationtraining.org/

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show, Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	The students and by the Department	• Questionnaires • Discuss students
Quality of learning resources	Program leaders and peer reviewer	• Peer consultation by departmental specialized committee. • Self-evaluation of the program by the departmental plan committee.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Revised March 2022

Course Title:	**Bioremediation**
Course Code:	
Program:	**Environmental Science Program**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**UM AL – QURA UNIVERSITY**
Revision Date	**March 2022**

Table of Contents

A. Course Identification

1. Credit hours: 3 hours
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ■ Elective ☐
Level/year at which this course is offered: **Third Year / Level 7**
4. Pre-requisites for this course (if any)**: Fundamentals of Microbiology**
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**30**	**50 %**
2	**Blended**		**-**
3	**E-learning**		**-**
4	**Correspondence**		**-**
5	**Other**	**30**	**50 %**

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	**30**
2	**Laboratory/Studio**	**42**
3	**Tutorial**	**-**
4	Practical/Field work/Internship	**6**
5	**Others** (specify)	**30**
	Total	**102**
Other Learning Hours*		
1	**Study**	**30**
2	**Assignments**	**8**
3	**Library**	**15**
4	**Projects/Research Essays/Theses**	**10**
5	**Others** (specify)	**-**
	Total	**63**

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description :

In this course: introduction to environmental pollutions, biodegradation and bioremediation different chemical and biological pollutants including plant and animal wastes, pesticides, crude oil wastes, dyes, heavy metals will be covered. In additions, sewage water treatments, physical, chemical and biological factors affecting biodegradation and bioremediation will be discussed.

2. Course Main Objective

- **After completing this course students should be able to:**
- List the major types of Microorganisms in the environment
- Understand of the risks of the environmental pollutants on human, animal and plants
- List the benefits and hazardous roles of the microorganisms in the environment and life.
- Differentiation between bioremediation and biodegradation
- List the type of environmental pollutants
- Understand the Pathways of microbial bioremediation of pollutants
- Summarize physical, chemical and biological factors affecting pollutants degradation
- Understand biodegradation and bioremediation of organic matter, pesticides, insecticides, crude oil wastes, textile dyes, and heavy metals,
- Discuss the concept of the polluted soil, Phytoremediation, Biodegradation of pesticides, insecticides, roles of soil microorganisms in biodegradation of pesticides and insecticides

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
	❖ Having successfully completed the course students should be • Understand of the risks of the environmental pollutants on human, animal and plants • List the benefits and hazardous roles of the microorganisms in the environment and life. • List the type of environmental pollutants • List the type of environmental pollutants • Summarize physical, chemical and biological factors affecting pollutants degradation • List the methods used for biological treatment • List the Microorganisms used in bioremediation of crude oil wastes • List of the Microorganisms used in bioremediation of heavy metals	
2	**Skills:**	
2.1	**Cognitive skills to be developed**	

	CLOs	Aligned PLOs
	❖ Having successfully completed the course students should be able to: • Differentiation between bioremediation and biodegradation . • Understand of the risks of the environmental pollutants on human, animal and plants • Discuss the benefits and hazardous roles of the microorganisms in the environment and life. • Understand the Pathways of microbial bioremediation of pollutants • Explain why some microorganisms could degrade the pollutant and others couldn't. • Understand biodegradation and bioremediation of organic matter, pesticides, insecticides, crude oil wastes, textile dyes, and heavy metals, • Discuss the concept of the polluted soil, Phytoremediation, Biodegradation of pesticides, insecticides, roles of soil microorganisms in biodegradation of pesticides and insecticides	
2.2.	**Psychomotor Skills** ❖ Upon successful completion of this course, the student is expected to be able to: • Perform the laboratory experiments precisely • Operate all devices in lab • Isolation and subculturing the important microorganisms capable to degrade the targeting pollutant	
3	**Values:**	
	❖ Upon successful completion of this course, the student is expected to be able to: • Developing oral presentations. • Communicating personal ideas and thoughts. • Work independently and as part of a team to finish some assignments. • Communicate results of work to others. • Use of needed precautions when dealing with pathogen microorganisms • Demonstrate professional attitudes and behaviors towards others. • Propose the smart questions • Understand and dissecting the problem so that it is fully solved understood. • Demonstrate the assertiveness for his decision. • Demonstrate his capability for the responsibility and Accountability • Show Effective verbal communication with clarity and must be characterize with the following interpersonal attributes; (verbal communication, Non-verbal communication, good listening for the others, questioning, good manners, problem solving, Social awareness, self-management, responsibility and accountability) • Enhancing the ability of students to use computers and internet. • Interpret the laboratory data. • Know how to write a report.	

C. Course Content

No	List of Topics	Contact Hours
1	❖ **Introduction to environmental pollutions,** - Differentiation between bioremediation and biodegradation - Concept of environmental pollutions - Environmental hazards - Terminology related pollutions - Type of environmental pollutions.	2
2	❖ **Biological treatment** -Advantages of Bioremediation and biodegradation - Problems face the biological treatments - Pollutants suitable for biological treatment - methods for biological treatment -Microorganisms involved in bioremediation	2
3	❖ **Pathways of microbial bioremediation** -Dichlorination - Hydrolysis - Cleavage - Oxidations - Dehydrogenation - Dehalogenation ❖ **Factors affect the bioremediation of pollutants** ❖ **Bioavailability of environmental pollutions**	2
4	❖ **Bioremediation and biodegradation of organic Wates and pollutants** - Biodegradation of organic and cellulolytic compounds -composting of plant and animal wastes	2
5	❖ **Biological treatment of wastewater**	2
6	**Midterm Exam**	2
7	❖ **Bioremediation of hydrocarbons** -Biodegradation of crude oils and crude oil wastes	2
9	❖ **Biodegradation of nitrogen-containing pollutants** -Biodegradation of Azo dyes	2
10	❖ **Bioremediation of heavy metals-polluted ecosystems** - Sources of pollution with heavy metals - Biological removal of heavy metals - Mechanisms of removal of heavy metals - Microorganisms used in the bioremediation of heavy metals - Biomining and bioleaching -	2
11	❖ **Bioremediation of polluted soil** - concept of soil pollution - Effect of heavy metal on microorganisms and plants - Consequences of soil deterioration - Soil organic pollutants	2

	- Phytoremediation - Biodegradation of pesticides, insecticides -Roles of soil microorganisms in biodegradation of pesticides and insecticides	
12	❖ **Bioremediation of air pollution** - Phytoremediation - Benefit of phytoremediation - Limitation of the phytoremediation in biological treatment - Examples of phytoremediation of air pollutants	**2**
13	❖ **Evaluation of bioremediation** - Methods for flow and evaluation of biological treatment - Evaluation of toxicity risks - Environmental biomarkers	**2**
14	**Final Exam**	**2**
	Total	**28hrs**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	❖ Having successfully completed the course students should be • Understand of the risks of the environmental pollutants on human, animal and plants • List the benefits and hazardous roles of the microorganisms in the environment and life. • List the type of environmental pollutants • List the type of environmental pollutants • Summarize physical, chemical and biological factors affecting pollutants degradation • List the methods used for biological treatment • List the Microorganisms used in bioremediation of crude oil wastes • List of the Microorganisms used in bioremediation of heavy metals	• Lectures which must start with preliminary one showing course contents • Using images and movies • Studying microorganisms from different environmental specimens in the lab. • Encouraging students to collect new information about different important microorganisms used in bioremediation and biodegradation of the different pollutants • Enable the reference books and scientific	• Periodical exam and reports 10% • Mid- term theoretical exam 20% • Mid-term practical exam 5% • Final practical exam 15% • Final exam 50%

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		sites concerning environmental pollutants.	
2.0	**Skills**		
2.1	**Cognitive skills to be developed** ❖ Having successfully completed the course students should be able to: • Differentiation between bioremediation and biodegradation. • Understand of the risks of the environmental pollutants on human, animal and plants • Discuss the benefits and hazardous roles of the microorganisms in the environment and life. • Understand the Pathways of microbial bioremediation of pollutants • Explain why some microorganisms could degrade the pollutant and others couldn't. • Understand biodegradation and bioremediation of organic matter, pesticides, insecticides, crude oil wastes, textile dyes, and heavy metals, • Discuss the concept of the polluted soil, Phytoremediation, Biodegradation of pesticides, insecticides, roles of soil microorganisms in biodegradation of pesticides and insecticides.	• Lectures. • Brain storming. • Discussion.	• Exam must contain questions that can measure these skills. • Quiz and exams. • Discussions after the lecture.
2.2	**Psychomotor Skills** ❖ Upon successful completion of this course, the student is expected to be able to: ❖ Perform the laboratory experiments precisely ❖ Operate all devices in the lab ❖ Perform aseptic microbiological techniques.	- Follow up students the students in lab and carry out all the laboratory experiments	-Giving additional marks for the students they have accurate laboratory results and good seminar presentation -Practical exam.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	❖ Preparation different media for isolation and cultivation of microorganisms ❖		
2.3			
3.0	**Values:**		
	❖ Upon successful completion of this course, the student is expected to be able to: • Developing oral presentations. • Communicating personal ideas and thoughts. • Work independently and as part of a team to finish some assignments. • Communicate results of work to others. • Use of needed precautions when dealing with pathogen microorganisms • Demonstrate professional attitudes and behaviors towards others. • Propose the smart questions • Understand and dissect the problem so that it is fully solved understood. • Demonstrate the assertiveness for his decision. • Demonstrate his capability for the responsibility and Accountability • Show Effective verbal communication with clarity and must be characterized with the following interpersonal attributes; (verbal communication, Non-verbal communication, good listening for the others, questioning, good manners, problem-solving, social awareness,self-management, responsibility, and accountability) • Enhancing the ability of students to use computers and the internet. • Interpret the laboratory data. • Know how to write a report.	- Lab work - Case Study - Active learning - Small group discussion - Homework (preparing a report on some topics related to the course depending on web sites). - Seminars presentation - Practical during carryout the experiments in the lab.	- Oral exams. - Evaluate the efforts of each student in preparing the report. - Evaluate the scientific values of reports. - Evaluate the work in team - Evaluation of the role of each student in lab group assignment - Evaluation of students presentations

2. Assessment Tasks for Students

5. Schedule of Assessment Tasks for Students During the Semester				
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Exam duration	Proportion of Final Assessment
1	**Periodical Exam (s)**	**3**	**15 min**	**10 %**
2	**Mid Term Exam (Theoretic)**	**6**	**60 min**	**20 %**
3	**Mid Term Exam (practical)**	**6**	**30 min**	**10 %**
4	**Reports and essay**	**11**	**--**	**5 %**
5	**Final Practical Exam**	**13**	**60 min**	**15 %**
6	**Final Exam**	**14**	**120 min**	**40 %**
			Total Marks	**100%**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Office hours: 10hrs.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	(1) Rashed Zaghloul, Hussien Abulreech, Khaled Elbanna (2021), Bioremediation of environmental pollutants, Tkween Publisher, Saudi arabia (1)- Ollivier, B. and Magot, M. (2005) *Petroleum Microbiology*. ASM Press, Washington DC, USA. (2)- Atlas, RM, and Philp, J. (2005) *Bioremediation: Applied Microbial Solutions for Real-World Environmental Cleanup*. ASM Press, Washington DC, USA.

Essential References Materials	Ernest Beerstecher Jr. (2013) Petroleum Microbiology: An Introduction to Microbiological Petroleum Engineering.
Electronic Materials	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC309048/
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Class room is already provided with data show • The area of class room is suitable concerning the number of enrolled students (68) and air conditioned
Technology Resources (AV, data show, Smart Board, software, etc.)	• Digital lab containing 15 computers.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• Incubators, autoclaves, measuring equipment, water bath, digital balances, pH meters, safety facilities. • Availability of some reference bacterial strains • Cultural media and all chemical that needed

G. Course Quality Evaluation

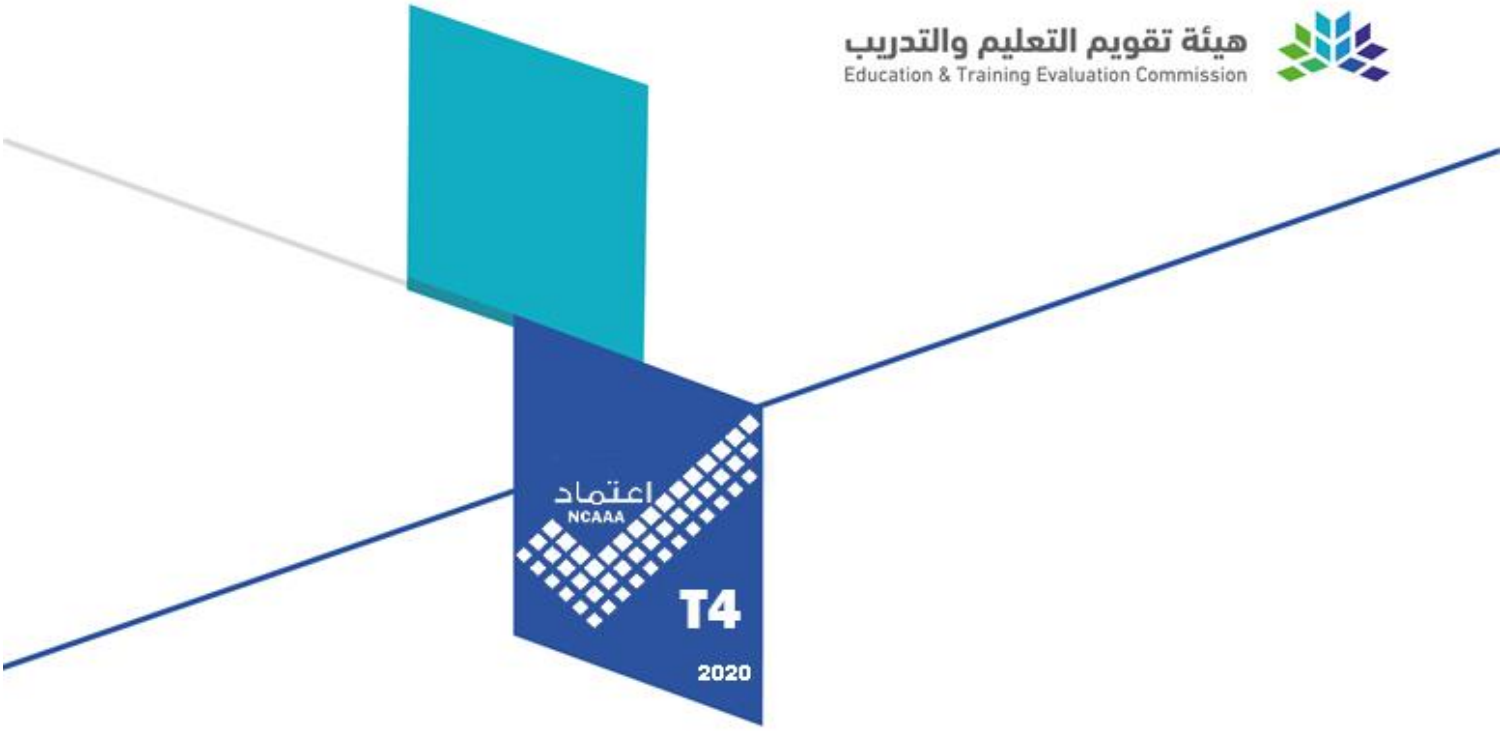
1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching • **Questionaries** • **Open discussion in the class room at the end of the lectures.**
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department • **Revision of student answer paper by another staff member.** • **Analysis the grades of students.**
3. Processes for Improvement of Teaching • **Preparing the course as PPT.** • **Using scientific movies.** • **Coupling the theoretical part with laboratory part** • **Periodical revision of course content.**
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • **After the agreement of Department and Faculty administrations**
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • **Periodical revision by Quality Assurance Units in the Department and institution**

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

H. Specification Approval Data

Council / Committee	Prof. Dr. Khaled Elbanna, professor of microbiology and biotechnology
Reference No.	
Date	**March 2022**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Biostatistics
Course Code:	
Program:	Environment Science
Department:	Biology Department
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours: 3 Credits
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: first Year / 3ed Level
4. Pre-requisites for this course (if any)**:** Introduction to Calculus 1st Year / 2nd Level
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	40	100%
2	**Blended**	-	-
3	**E-learning**	-	-
4	**Distance learning**	-	-
5	**Other**	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	10
3	**Tutorial**	-
4	**Others** (specify)/ Office hours	-
	Total	40 hrs

B. Course Objectives and Learning Outcomes

1. Course Description

Introduction to methods and concepts of statistical analysis and sampling, with special attention to those occurring in biological sciences. Topics include Frequency Distributions, Graphs, Descriptive statistics and Inferential Statistics. The class is applied using examples from real life and through statistical software.

2. Course Main Objective

The purpose of the course is to teach fundamental concepts and techniques of descriptive and inferential statistics with applications in biology. Basic statistics, including, descriptive statistics, inference for parametric and non-parametric methods are presented. The analytic methods and applications will be linked to topics including real life problems, and program evaluation.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
K1	To understand the basics terms of biostatistics, types of variables numerical or categorical , and different sampling types.	
K2	To understand the concepts of descriptive statistic, tables graphs and measures, and how they are used in statistical analysis.	
K3	To understand methods of statistical inference including parametric and non-parametric methods .	
K4	To understand the difference between descriptive and inferential statistics and when do we use them in real life.	
2	**Skills :**	
S1	Choose an appropriate graphical or tabular display for a given data set and question	
S2	Determine which basic statistical method(s) is/are most appropriate to analyze the data at hand	
S3	Analyze data using fundamental statistical methods	
3	**Values:**	
V1	Work collaboratively and constructively in teams with responsibility	
V2	A commitment to continuous learning and the capacity to maintain intellectual curiosity throughout life.	

C. Course Content

No	List of Topics	Contact Hours
1	**Introduction to Biostatistics Science** - Variables and Types of Data - Data Collection and Sampling Techniques - Experimental Design	10

2	**Data presentation (Frequency Distributions and Graphs)** - Organizing Data - Histograms, Frequency Polygons, and Ogives - Other Types of Graphs as Bar graphs, Pareto charts, the time series	10
3	**Descriptive Statistics** - Measures of central tendency - Measures of dispersion - Measures of position	10
4	**Introduction to Statistical Inference** - Concept of hypothesis testing - Parametric tests - Non-parametric tests	10
Total		**40**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

	CLOs	Teaching Strategies	Assessment Methods
1	**Knowledge and Understanding**		
K1	To understand the basics terms of biostatistics, types of variables numerical or categorical , and different sampling types.	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
K2	To understand the concepts of descriptive statistic, tables graphs and measures, and how they are used in statistical analysis.	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
K3	To understand methods of statistical inference including parametric and non-parametric methods .	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
K4	To understand the difference between descriptive and inferential statistics and when do we use them in real life.	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
2	**Skills :**		

CLOs		Teaching Strategies	Assessment Methods
S1	Choose an appropriate graphical or tabular display for a given data set and question	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
S2	Determine which basic statistical method(s) is/are most appropriate to analyze the data at hand	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
S3	Analyze data using fundamental statistical methods	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
3	**Values:**		
V1	Work collaboratively and constructively in teams with responsibility	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities
V2	A commitment to continuous learning and the capacity to maintain intellectual curiosity throughout life.	Lectures Lab work	Quiz. Final and mid-term exam. Assignments and activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes, Assignats, Problem set, Projects		25%
2	Miderm Exam (Lecture)		25%
6	Final Exam (Lecture)		50%
8	Total		100%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

4 office hours per week

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1- Daniel, W. W., & Cross, C. L. (2018). Biostatistics: a foundation for analysis in the health sciences. Wiley. 2- Bluman, A. G. (2017). Elementary statistics: A step by step approach. New York;: McGraw-Hill Higher Education.
Essential References Materials	1. Griffith, A. (2007). SPSS for Dummies. John Wiley & Sons. 2. Evans, M. (2009). Minitab manual
Electronic Materials	.
Other Learning Materials	3. Handouts and Lecture notes 4. Microsoft office package.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	1. Lecture room 2. Data show.
Technology Resources (AV, data show, Smart Board, software, etc.)	1. Computers or internet connection. 2. Active Board.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

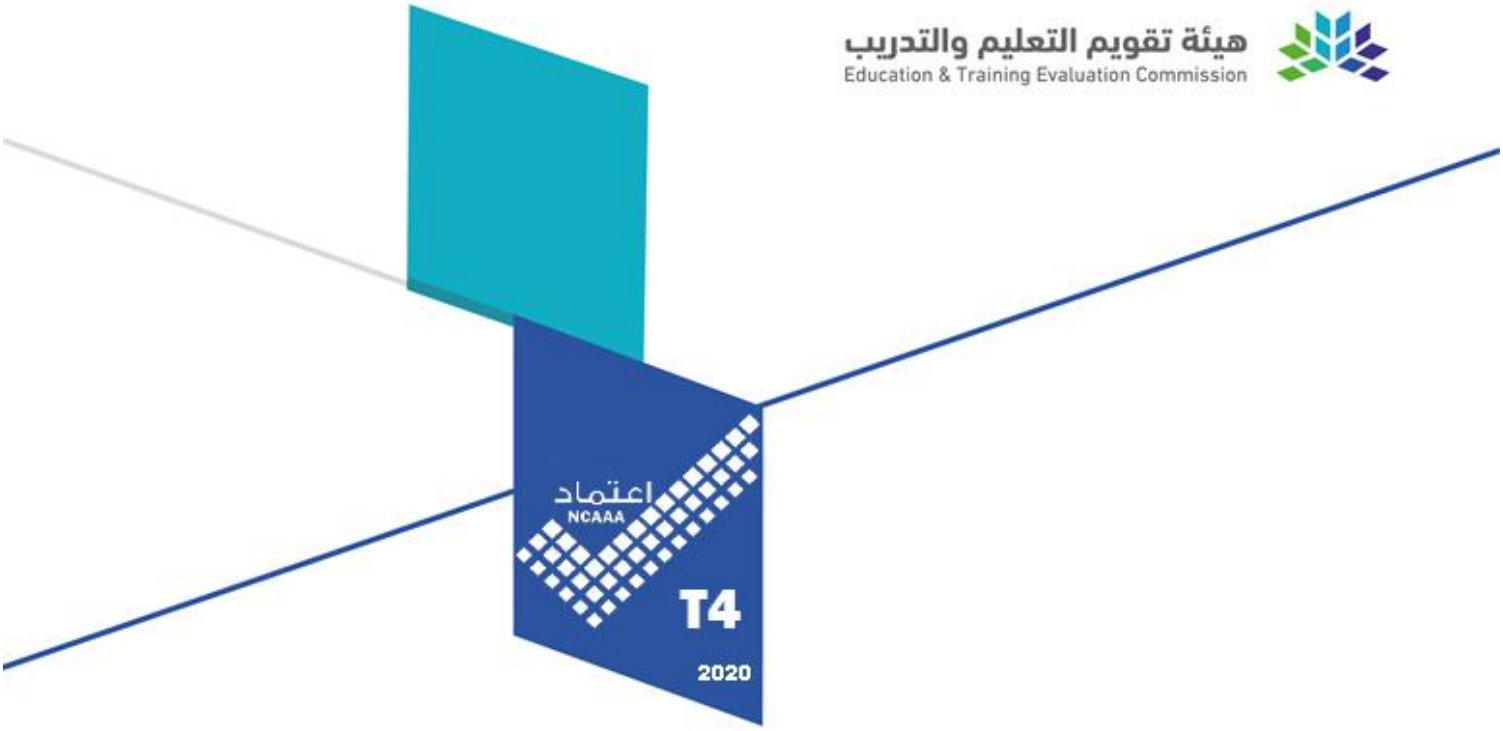
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Observations and the assistance of colleagues.	Faculty	Indirect
Effectiveness of teaching and assessment	Program leader, curriculum committee; external reviewers	Direct
Extent of achievement of CLO's	Peer Reviewer	Direct

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Chemical Safety
Course Code:	
Program:	Environmental Sciences
Department:	Chemistry
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours: 2 (theoretical)
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: 6th level/2nd year
4. Pre-requisites for this course (if any)**: Inorganic Chemistry**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (exam)	4
	Total	24

B. Course Objectives and Learning Outcomes

1. Course Description

This course concerns about laboratories, chemicals, chemical wastes, radiations and how to work safely with them.

2. Course Main Objective

By the end of this course student have all information about:

a. Understanding the chemicals nature and hazards in laboratories.
b. Understanding the importance of MSDS and COSHH forms.
c. Implementing methods of self-protection while dealing with chemicals and radiations.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Know different laboratories, their composition and how to handle chemicals.	K2
1.2	Recognize the hazards associated with the work environment.	K3

CLOs		Aligned PLOs
1.3	Describe the measures used for working safe in laboratories.	K3
2	**Skills :**	
2.1	Develop the reverse think skills and predict the suitable procedures for working with chemicals.	S2
2.2	Explain the methods used for mitigating the hazards associated with different chemicals and wastes.	S1
2.3	Explain the suitable method to work with radioactive materials and laboratories.	S6
3	**Values:**	
3.1	Write COSHH forms to illustrate information related to hazardous chemicals in some laboratories.	V4
3.2	Work collaboratively and constructively in teams to extract MSDS and write COSHH forms.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction, laboratory definition, types, composition and use.	2
2	Recognizing hazards, definition, physical hazard examples, health hazard examples and pictograms.	2
3	Hazardous waste – Biomedical waste	2
4	Material safety data sheet (MSDS)	2
5	Radiation hazards, x-ray, lazer ….etc	2
6	Mid-term exam	2
7	Safety in the laboratories	2
8	Special requirements for peroxides, explosives.	2
9	Safety equipment. How to deal with spills	2
10	Chemical emergency response procedure, accident reporting and documentation.	2
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Know different laboratories, their composition and how to handle chemicals.	Lectures and Scientific discussion	Quiz
1.2	Recognize the hazards associated with the work environment.	Lectures and Scientific discussion	Quiz and Exam
1.3	Describe the measures used for working safe in laboratories.	Lectures and Scientific discussion	Quiz and Exam
2.0	**Skills**		
2.1	Develop the reverse think skills and predict the suitable procedures for	Lectures and short essays	Essays

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	working with chemicals.		
2.2	Explain the methods used for mitigating the hazards associated with different chemicals and wastes.	Scientific discussion	Essays
2.3	Explain the suitable method to work with radioactive materials and laboratories.	Scientific discussion	Exams and essays
3.0	**Values**		
3.1	Write COSHH forms to illustrate information related to hazardous chemicals in some laboratories.	Class discussion and research activity	Overall student performance in Lab.
3.2	Work collaboratively and constructively in teams to extract MSDS and write COSHH forms.	Class discussion and research activity	Cross questions after finishing laboratory work

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	--	10 %
2	Midterm Exam 1.	5	20 %
3	Midterm Exam 1.	8	20 %
4	Final Exam. (2hours Exam)	12	50 %
5	**Total**		100%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- We have faculty members to provide counselling and academic advice.
- 2 hours per week as office hours are available for discussion with the students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Stephen K. Hall, ***Chemical safety in the laboratory***, CRC press (2018) • IIya Obodovskiy, ***Fundamentals of radiation and chemical safety***, Elsevier (2015)
Essential References Materials	Lecture hand outs available on the coordinator website
Electronic Materials	• **http://www.chemweb.com** • **http://www.sciencedirect.com** • **http://www.rsc.org**

Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms capacity (30) students. • Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Room equipped with computer and projector and TV.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• No other requirements.

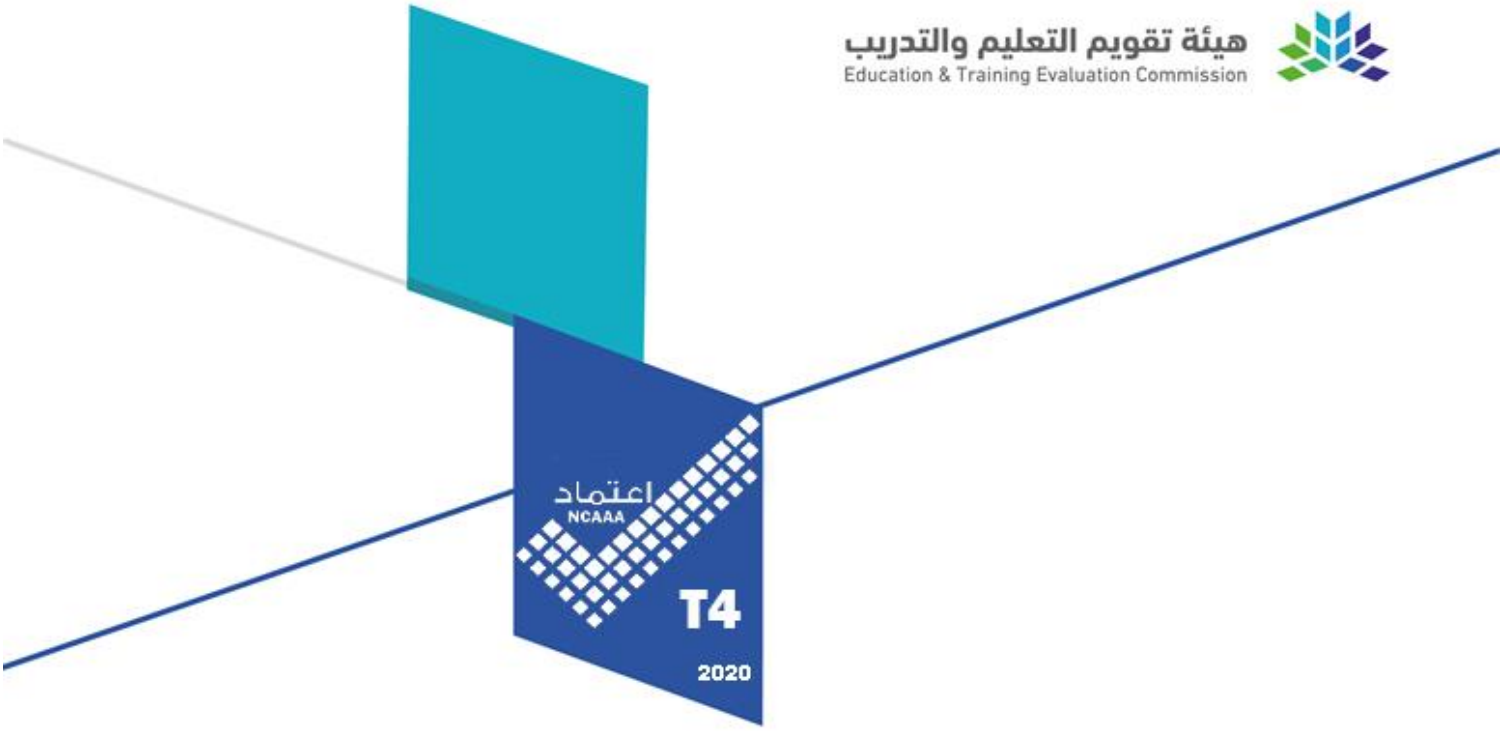
G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty Indirect (feedback from faculty and students).
Quality of learning resources	Students	Direct (feedback from faculty). Indirect (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	30 – 3 - 2022



Course Specifications

Course Title:	Climate change and its environmental impact
Course Code:	
Program:	BSc. Environmental Sciences
Department:	Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 10/3
4. Pre-requisites for this course (if any)**:** Environmental Physics
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	3 per week (30 per semester)	%100
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

The course covers the scientific basis to understand climate change. It includes description of Earth's present climate system, and explores the drivers of climate change, the consequences of climate change, how climate change can affect humanity, and how humans are affected, as well as the technologies to reduce such change.

2. Course Main Objective

The course addresses the main drivers of climate change and the challenge posed by climate mitigation: approaches to avoid an uncontrolled and large climate change through global warming. The course addresses the following issues:

- The greenhouse effect, global warming and the response of the climate system to anthropogenic emissions or land use changes.
- Possible consequences of climate change, adaptation and associated costs.
- Biogeochemical cycles of carbon and other important greenhouse gases and biophysical properties of land-climate interactions.

- Technological options to reduce emissions (renewable energy, changes in lifestyle, negative emission technologies and solar radiation management).

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Define the fundamentals and basic concepts of climate change: the climate system, climate change and its drivers, consequences, and future expectation.	K1
1.2	Describe the physical laws governing the radiation balance, the greenhouse effect. CO2 emission, and renewable energy options.	K2
2	**Skills:**	
2.1	Solve, evaluate, and calculate the Global weather patterns and climate changes and the expected future consequences.	S1,S4
2.2	Explain physics concepts, processes, and results, both orally and in writing related to climate change.	S5
3	**Values:**	
3.1	Cooperate responsibly and effectively within the teamwork	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Climate Change 1. Global Worming and Greenhouse Effect 2. Albedo and the Greenhouse Effect. 3. Global Energy Flow. 4. CO2 and the Carbon Cycle. 5. Feedbacks and Climate Modeling	3
2	The climate system 1. The Atmosphere 2. The World Ocean 3. Ocean– Atmosphere Interactions 4. The Carbon Cycle and How It Influences Climate	6
3	Climate change and its drivers 1. The Concept of Radiation Balance, a Scientific Framework for Thinking About Climate Change 2. Radiative Forcing, Feedbacks, and Some Other Characteristics of the Climate System 3. Learning from the Climate of the Distant Past	6
4	Consequences of climate change 1. The Climate of the Recent Past and Impacts on Human History 2. Observing the Change 3. Greenland, Antarctica, and Sea- Level Rise	6
5	The future 1. Climate Models and the Future 2. Climate Change Risk in an Unknowable Future 3. Energy and the Future	6
6	How Do We Manage Climate Change? 1. Reducing Emissions 2. Managing Climate Risk Through mitigation	3

	3. Managing Climate Risk Through Adaptation	
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1	**Knowledge and Understanding**		
1.1	Define the fundamentals and basic concepts of climate change: the climate system, climate change and its drivers, consequences, and future expectation.	1. Lecturing 2. Starting with topic outlines. 3. Demonstrate the basic principles. 5. Solve problem 6. Brain storming	a) Mid exams. b) Final exam. c) Homework. d) Oral Questions.
1.2	Describe the physical laws governing the radiation balance, the greenhouse effect. CO_2 emission, and renewable energy options.		
2.0	**Skills:** to know how to assess, evaluate, or calculate the following:		
2.1	Solve, evaluate, and calculate the Global weather patterns and climate changes and the expected future consequences.	Lecturing, discussion, and problem-solving.	a) Mid exams. b) Final exam. c) Homework. d) Oral Questions.
2.2	Explain physics concepts, processes, and results, both orally and in writing related to climate change.		
3	**Values:** to practice and interact the safety culture related to:		
3.1	Cooperate responsibly and effectively within the teamwork	1. Presentations 2. Scientific reports and team projects.	Reports and presentations evaluation.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Weekly quizzes	Through term	10
2	Homework	Through term	10
3	Mid Exam	6	30
4	Final Exam	12	50

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
Consultation and/or academic advice will be available during the teaching staff office hours

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Edmond A. Mathez and Jason E. Smerdon. Climate Change. 2nd Ed. 2018. Columbia University Press New York.
Essential References Materials	1. Climate Change – Geophysical Foundations and Ecological Effects. Edited by Juan Blanco and Houshang Kheradmand. 2011 InTech. 2. Himalayan Glaciers: Climate Change, Water Resources, and Water Security. 2007. THE National Academies Press.
Electronic Materials	https://www.globalwarmingindex.org/
Other Learning Materials	https://www.ncdc.noaa.gov/monitoring-references/faq/indicators.php http://www.metoffice.gov.uk/climate-guide

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Traditional Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NA

G. Course Quality Evaluation

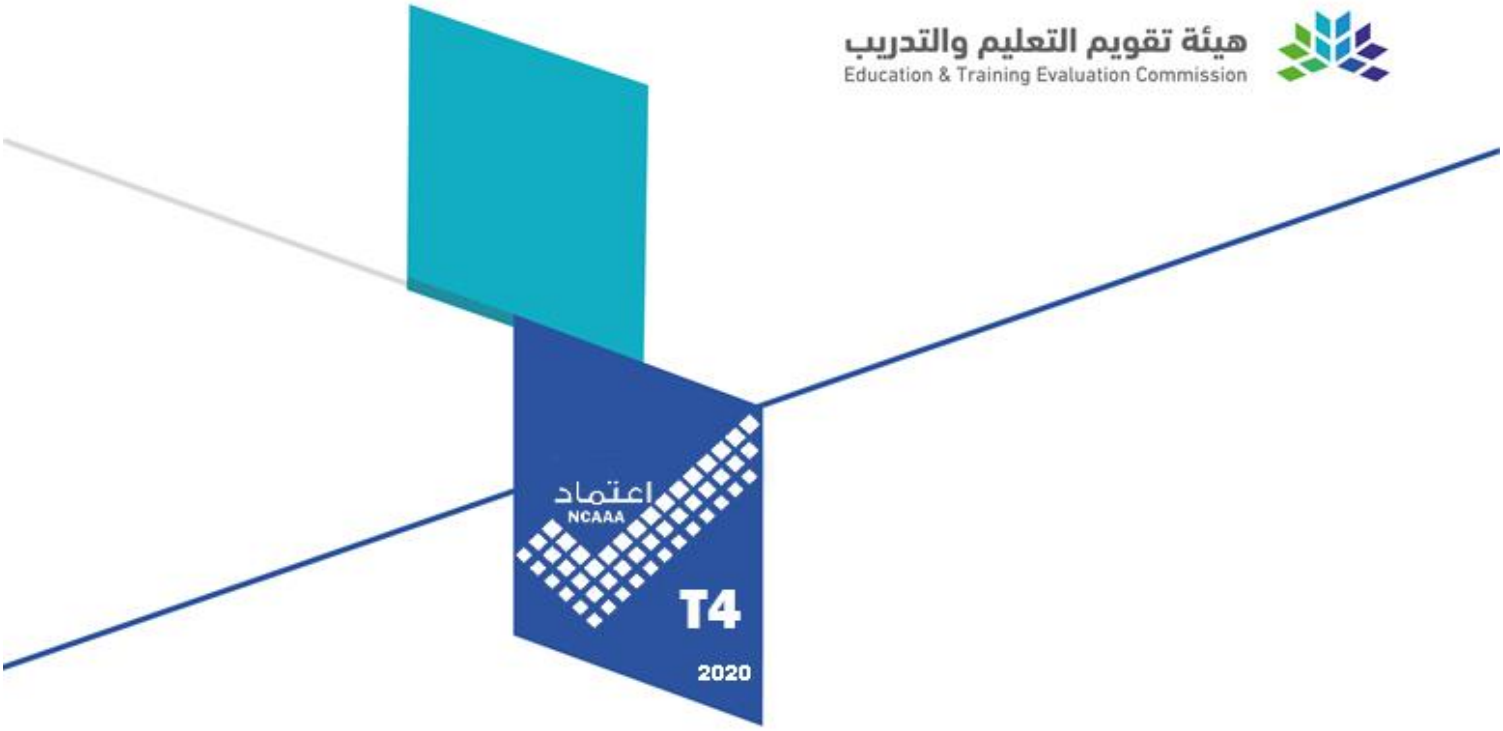
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course content	Instructor, students	Questionnaire.
Effectiveness of teaching Strategies	Students, Program administrator	Questionnaire
Quality of learning resources	Instructor, Peer Reviewer	Course report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Control of Pollution in Petrochemicals Industry**
Course Code:	
Program:	**Environmental Science**
Department:	**Chemistry**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 2hrs
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: 10th level/ 4th year
4. Pre-requisites for this course (if any)**: Organic spectroscopy**
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**	---	---

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	---
3	**Tutorial**	---
4	**Others** (specify)	4
	Total	24

B. Course Objectives and Learning Outcomes

1. Course Description

This course discuss the main features of the petrochemicals industry and its overall impact on environmental pollution. Separate attention is paid to the identification and estimation of the main sources of air emission, waste water and solid waste generated by this industry.

2. Course Main Objective

By finishing the course, the student will be familiar with hazardous material releases, fires, and explosions. Also, fundamentals of combustion and emissions

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Describe some aspects of the petrochemical industry	K2
1.2	Outline physical properties of hydrocarbons and petrochemicals	K1

CLOs		Aligned PLOs
1.3	Summarize the characteristics of hazardous material releases, fires, and explosions	K3
1.4	Discuss the gas composition calculations	K1
2	**Skills :**	
2.1	Illustrate batch sampling and wet chemical methods of gas analysis	S3
2.2	Explain the control and treatment of air emissions	S4
2.3	Design optical methods of gas analysis	S1
2.4	Evaluate wastewater treatment in the petrochemical production industry	S6
3	**Values:**	
3.1	Demonstrate commitment to professional and academic values, and ethics in the field of petrochemical industry	V1
3.2	Write and present a chemical report related to wastewater treatment in the petrochemical production industry.	V4

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to the Petrochemical Industry	2
2	Physical Properties of Hydrocarbons and Petrochemicals	2
3	Characteristics of Hazardous Material Releases, Fires, and Explosions	2
4	Gas composition calculations	2
5	Batch sampling and wet chemical methods of gas analysis	2
6	Optical methods of gas analysis	2
7	Control and Treatment of Air Emissions	2
8	Wastewater treatment in the petrochemical production industry	4
9	Fundamentals of combustion and emissions	2
Total		**20**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Describe some aspects of the petrochemical industry	Lectures	Assignments and activities
1.2	Outline physical properties of hydrocarbons and petrochemicals	Lectures Library visits Web based study.	Final and mid-term exam.
1.3	Summarize the characteristics of hazardous material releases, fires, and explosions	Lectures	Quiz.
1.4	Discuss the gas composition calculations	Lectures	Exams
2.0	**Skills**		
2.1	Illustrate batch sampling and wet chemical methods of gas analysis	Lectures	Quiz.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Explain the control and treatment of air emissions	Lectures	Final and mid-term exam.
2.3	Design optical methods of gas analysis	Lectures	Exams
2.4	Evaluate wastewater treatment in the petrochemical production industry	Lectures Library visits	Assignments and activities
3.0	**Values**		
3.1	Demonstrate commitment to professional and academic values, and ethics in the field of petrochemical industry	Web-based study	Class discussion
3.2	Write and present a chemical report related to wastewater treatment in the petrochemical production industry.	Scientific discussion	Assignment activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	-	10%
2	First Periodic Exam.	4	20%
3	Second Periodic Exam.	10	20%
4	Final Exam. (2 hours exam)	12	50%
5	**Total**		**100%**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- A faculty member was assigned to provide counseling and advice (about 20-25 student/ one faculty member).
- Office hours of the instructor: during the working hours weekly.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Industrial Combustion Pollution and Control (Environmental Science & Pollution), Charles E. Baukal , 2004 by Marcel Dekker, Inc. All Rights Reserved • Pollution control in the petrochemicals industry, M. Brett Borup, E. Joe Middlebrooks, 1987 by CRC Press Taylor & Francis Group • Handbook of Fire and Explosion Protection Engineering Principles for the Oil, Gas, Chemical, and Related Facilities, DENNIS P. NOLAN, 2019 Elsevier Inc. All rights reserved • Industrial Air Pollution Monitoring, Andrew G. Clarke, 1998 Chapman & Hall
Essential References Materials	Electronic lecture handouts are available for the students either on blackboard or via their e-mail

Electronic Materials	Chemistry related web sites such as: http://www.chemweb.com http://www.sciencedirect.com http://www.rsc.org
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with capacity of (30) students.
Technology Resources (AV, data show, Smart Board, software, etc.)	Teaching halls and laboratories are equipped with data show projector ad electronic board screen
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Some Specialized software's for chemistry e.g. Institutional License for Chem Office , ACD labs, etc.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty
Quality of learning resources	Students	Direct (feedback from faculty).

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

H. Specification Approval Data

Council / Committee	Quality committee and department Council
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Desertification**
Course Code:	
Program:	**BSc Environmental Sciences**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura university**

Table of Contents

A. Course Identification

1. Credit hours: 2
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: **Level 7 / Year 3**
4. Pre-requisites for this course (if any)**:** **- Principle in Ecology**
5. Co-requisites for this course (if any)**:** **None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	20

B. Course Objectives and Learning Outcomes

1. Course Description

This course reviews and discusses the problem of desertification: what it is, its causes, manifestations, effects, and scope. It proceeds to provide an overview of international law that has been developed to address desertification and the attendant ecological and socio-economic problems. This will be illustrated within a field area where desertification and land degradation are important processes. The course is a part of the semester focusing on water related issues, particularly in Countries experiencing Serious Drought and/or Desertification,

2. Course Main Objective

-In this course the results of water shortage, as expressed by groundwater over drafting, irrigation, salinization, and land degradation problems will be studied in the field.
- It addresses typical water related issues in dryland regions in contrast to the ecosystems which have excess of water, and that are being dealt with in the other courses in the program.

- The course has also a function in providing a field translation from classroom conditions to the field. As such it integrates earlier theoretical studied objects with real world field conditions.

-The course is preceded by a GIS course where techniques are learned to handle field spatial data in state-of-the-art process, both by preparation of pre-field material, as well as for processing field data themselves, and by implementing field knowledge into a model-based scenario study on the effects of climate change on degradation ad biomass production.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Apply theoretical earth scientific concepts in a landscape study.	
1.2	Make an inventory of landscapes to relate substratum-soil geomorphology, land use and water availability properties of the landscape.	
1.3	Integrate field observations in thematic maps with a written explanation.	
1.4	Relate the impact of climate, soil and land use with water management and degradation of dryland regions.	
1.5	Apply basic field inventory techniques.	
1.6	Apply some basic quantitative techniques related to degradation processes process and use these in a climate change or land use change scenario study.	
1.7	Effectively co-operate in small research teams with the assignment to efficiently collect and integrate data.	
1.8	Organize and Integrate data in an efficient manner.	
1.9	Apply field and lab data in a computer model for the purpose of quantifying soil hydrology and salinity.	
1.10	Conduct scenario analyses investigating the effects of climate change on contrasting soils or land uses.	
2	**Skills:**	
2.1	At the end of this course, the student will be able to: -Define desert and desert ecosystem. - Identify physical and biological factors shaping deserts. - Acquire knowledge of plants and animal's adaptations in desert ecosystem - Classify deserts and geography of. - Specify climatic factors and the environmental issue of desertification. - Understanding drought, and the variety of dry desert regions.	

CLOs		Aligned PLOs
	- Identify the desert plants and animals, and types of climates within the Kingdom of Saudi Arabia.	
2.2	**Interpersonal Skills and Responsibility:** At the end of the course, the student will be able to: - Be involved in self-directed learning. - Succeed in team Works. - Share and discuss results with others. - Be involved in a simple research project. - Evaluate answers and positively criticize them.	
2.3	**Communication, Information Technology and Numerical Skill** The student can propose solutions to some problems**:** - Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	
2.4	**Psychomotor Skills (if applicable)** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	
3	**Values:**	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3.4	- Communicate results of work to others.	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to the course and basic principles and concepts of agronomy and agroecology.	2
2	Soil (agricultural and natural soil and its characteristics: origin, grain, structure, chemical and biological characteristics; hydrological constants, evapotranspiration and calculation methods, soil sampling.	2
3	-Role of organic matter in the soil; calculation of the humic balance. -Role of microorganisms for soil conservation and fertility	2

	(Microorganisms promoting plant growth - symbiont nitrogen-fixing and mycorrhizal fungi).	
4	-Desertification: process, risk assessment and contrast agronomic interventions. -Loss of soil fertility: Erosion; Compaction; Salinization and sodification / sodicization.	2
5	Conservative agriculture (blue agriculture) Conservative cultivation of the soil.	2
6	***Mid-Term Exam.***	2
7	Agronomic techniques for soil conservation (windbreak, mulching, grassing (cover crops)) Notes on reforestation; Water footprint Agricultural land arrangements: Terracing and buffer strips.	2
8	Notes on regional agri-environmental measures (rural development program - 2014-2020 programming).	2
9	Outline of agro-environmental reuse of treated wastewater and systems for collecting rainwater in the soil (water harvesting).	2
10	Protective function of vegetated covers in agroecosystems arboreal: Herbaceous crops and natural grassy rinds.	2
11	Outlines of agronomic management of: oligophytic and polymate meadows; annual self-sowing legumes; alfalfa, on, vetch; Lolium spp., Festuca arundinacea, Dactylis glomerata.	2
12	***Final Examination.***	2
Total		24

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Apply theoretical earth scientific concepts in a landscape study.	-Teaching strategies to be used to develop that knowledge. - Lectures -Take home Assignment. - Internet activities.	1. Course work reports 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final exams 4. Checking the homework assignments
1.2	Make an inventory of landscapes to relate substratum-soil geomorphology, land use and water availability properties of the landscape.		
1.3	Integrate field observations in thematic maps with a written explanation.		
1.4	Relate the impact of climate, soil and land use with water management and degradation of dryland regions.		
1.5	Apply basic field inventory techniques.		
1.6	Apply some basic quantitative techniques related to degradation processes process and use these in a climate change or land use change scenario study.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.7	Effectively co-operate in small research teams with the assignment to efficiently collect and integrate data.		
1.8	Organize and Integrate data in an efficient manner.		
1.9	Apply field and lab data in a computer model for the purpose of quantifying soil hydrology and salinity.		
1.10	Conduct scenario analyses investigating the effects of climate change on contrasting soils or land uses.		
2.0	**Skills**		
2.1	At the end of this course, the student will be able to: -Define desert and desert ecosystem. - Identify physical and biological factors shaping deserts. - Acquire knowledge of plants and animal's adaptations in desert ecosystem - Classify deserts and geography of. - Specify climatic factors and the environmental issue of desertification. - Understanding drought, and the variety of dry desert regions. - Identify the desert plants and animals, and types of climates within the Kingdom of Saudi Arabia.	- Lectures. - Brain storming. - Discussion. - Seminars. - Self assessment. - Examination of selected micrographs and hand drawings.	1. Course work Reports. 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final Exams. 4. Checking the homework assignments.
2.2	**Interpersonal Skills & Responsibility** - Be involved in self-directed learning. - Succeed in teamwork. - Share and discuss results with others. -Be involved in simple research project. -Evaluate answers and positively criticize them.	-Case Study. -Active learning. -Small group discussion -Cooperative learning and application of scientific method in thinking the scientific problem solving. -Work as part of a team.	-Assissent of group assignements. -Evaluate the independent assignements.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	**Communication, Information Technology, Numerical** -Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	-Oral presentations. - Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
2.4	**Psychomotor:** (Description of the psychomotor skills to be developed and the level of performance **required:** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	- Follow-up students during field visits and write reports on them.	- Evaluating the laboratory written reports. - Evaluating the community participation**.**
3.0	**Values**		
3.1	- Use information and communication technology.	-Oral presentations. -Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
3.2	-Use IT and communication technology in gathering and interpreting information and ideas.		
3.3	-Use the internet as a means of communication and a source of information.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam.	6 th week	40 %
2	Activities.	10 th week	10 %
3	Final theory exam.	12 th week	50 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	
Essential References Materials	1. Peter Vincent (2008). Saudi Arabia an Environmental Overview, CRC Press. 2. Elanor Bell (2012). Life at Extremes: Environments, Organisms, and Strategies, CABI, Wallingford, Oxford shire, United Kingdom,
Electronic Materials	
Other Learning Materials	- Copies of all necessary material will be provided to the students. - Copies of additional recommended reading textbooks will be ordered at the library.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Computer laboratory might be used for software applications (homework's and design problem).
Technology Resources (AV, data show, Smart Board, software, etc.)	A combination of white board use, hand-outs, PowerPoint slide presentations, and interactive class discussions will be used. Open discussions are favored as they encourage students to participate and exchange and enhance the overall learning process.
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	A site visit may be arranged during the course.

G. Course Quality Evaluation

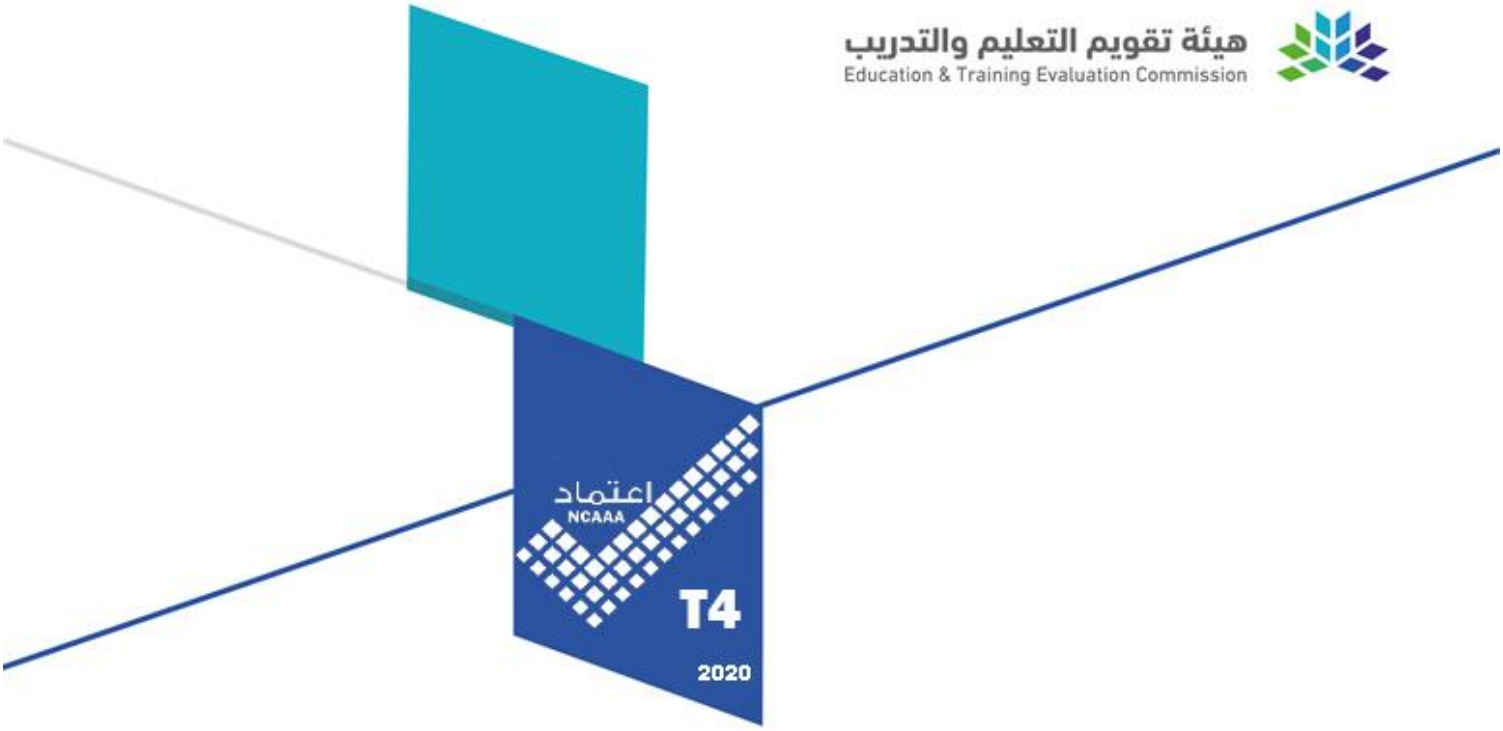
Evaluation Areas/Issues	Evaluators	Evaluation Methods
-Strategies for Obtaining student feedback on Effectiveness of teaching.	-The instructor or by the department.	Distribution of questionnaires for course evaluation by students. Students- faculty meetings.
- Other Strategies for Evaluation of teaching.	- The instructor or by the department.	-Data show is required in every room. -Smart Board departmental plan committee. -Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental studying plan committee.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Ecological Biochemistry
Course Code:	2hrs/ Week (2Lec.)
Program:	Environmental Science
Department:	Biology Department
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 4th year/Level 11
4. Pre-requisites for this course (if any)**: Biochemistry**
5. Co-requisites for this course (if any)**: N/A**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		80 %
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		10%
5	**Other**		10%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	20 h

B. Course Objectives and Learning Outcomes

1. Course Description

Ecological biochemistry refers to the interaction of organisms with their abiotic environment and other organisms by chemical means. Biotic and abiotic factors determine the biochemical flexibility of organisms, which otherwise easily adapt to environmental changes by altering their metabolism. Biochemical adaptations of plants to environment. Plant toxins and their effect on herbivores and pathogens. Hormonal interactions between plants and animals. Secondary biomolecules which attract and repell insects. Plant-vertebrates relationship, including humans. Static and induced plants defense mechanisms from predators. Defence substances: terpenoids, alkaloids, Phenolics and quinones. Phytoalexins and phytotoxins. The role of chemical signals in the intra and inter-cellular communication. Reactive species of oxygen and nitrogen. Antioxidant systems in plants and oxidative stress. Molecular mechanisms of plant resistance to abiotic stress (radiation, extreme temperatures, water stress, drought, salination, heavy metals and pesticides) Resistance mechanisms of plants to biotic stress. Induced plant stress resistance.

2. Course Main Objective

- To understand the biochemistry of interactions between animals, plants and the environment.
- Provide students with information needed to understand the Plant toxins and their effect on herbivores and pathogens. Hormonal interactions between plants and animals.
- Develop student's ability to learn and understand the role of chemical signals in the intra and intercellular communication. Reactive species of oxygen and nitrogen. Antioxidant systems in plants and oxidative stress.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize knowledge and basic information of eco-biochemistry and the interaction between animals, plants and environments.	**K1**
1.2	To describe the role of the interaction of organisms with their abiotic environment and other organisms by chemical means. Biotic and abiotic factors determine the biochemical flexibility of organisms	**K1**
1.3	Understanding the concept of the physico-chemical basis and biochemical roots of living cells, leading to secondary metabolites as crucial bridges between organisms and the respective ecosystem	**K3**
2	**Skills:**	
2.1	To Summarize most of the relation between animals, plants and their importance to the environment.	**S1**
2.2	To evaluate the risk of toxins and biochemical component to the organisms and the environment	**S2**
2.3	To interrupts the biochemical interactions of plants, fungi and bacteria within terrestrial and aquatic ecosystems with the aim of linking biochemical insights to ecological research.	**S3**
2.4	Students will know the interaction between toxins and the changes in the metabolism in plant and animal.	**S1**
3	**Values:**	
3.1	Appraise their time in self-study of the course materials (homework, conducted research)	**V1**
3.2	Analyze, write and exchange the data and to be able to continue learning and capacity to maintain intellectual curiosity throughout life.	**V2**
3.3	Working in teamwork.	**V3**

C. Course Content

No	List of Topics	Contact Hours
1	General introduction of the meaning of Eco biochemistry and its importance.	2
2	Systematics of life, its early evolution, and diversity of its ecological function.	2
3	Biochemical response to physicochemical stress (abiotic stress)	2

4	Organismal interactions (biotic stress)	2
5	Detoxification mechanisms (plant toxins and their effect on animals)	4
6	Hormonal interaction between plant and animal	4
7	Plant defense and animal response.	4
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize knowledge and basic information of eco-biochemistry and the relationships between biomolecules and their importance functions.	• Classroom lecturing • Homework assignments • Discussions (connecting what they learn in the class. • Handout of lecture notes for each topic • Small group discussions.	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports • Oral presentation
1.2	To describe the systematics of life, its early evolution, and diversity of its ecological function		
1.3	To Recall and differentiate between the biochemical response to physicochemical stress (abiotic stress) and Organismal interactions (biotic stress)		
1.4	To define the detoxification mechanisms (plant toxins and their effect on animals)		
1.5	Understanding the concept of hormonal interaction between plant and animal as well as plant defense and animal response		
2.0	**Skills**		
2.1	Students will understand the concept of eco-biochemistry and its importance to plant and animal life	• Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). • Homework assignments	
2.2	To evaluate the interrelationships between biomolecules in plant and animal ant its function in normal and up normal conditions		
2.3	Student will be able to understand the harmful components and their toxicity to plant and animal and the relation between the biomolecule's abnormalities in plant and animal.		
2.4	Student will know the functions and mechanism of hormonal interaction in normal and up normal condition in the environmental.		
3.0	**Values**		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.1	To be able to evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.	• In-class lecturing • Homework assignments • Presentation and discussions	• Homework and quizzes. • Med/Final exams • Presentation (Individual or in groups) to evaluate the knowledge of understanding. • Research search assignments.
3.2	Learn continuously through self-study and or experience to recognize the value of learning.		
3.3	Work collaboratively and effectively in teams		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodical Exam (s)	3th	10
2	Mid-term Exam (written exam)	5th	30
3	Reports and essay	8th	10
4	Final Exam (written exam)	11-12th	50
5	Total		100

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Faculty members must be available for academic counseling and support.
- E-mail communications.
- Private tutorial (weekly)

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- Ecological Biochemistry, Environmental and Interspecies Interactions by Gerd-Joachim Krauss, Dietrich H. Nies. - Introduction to Ecological Biochemistry by J.B.harborne, Academic press, 4th edition.
Essential References Materials	Seeking information through searching in www.google.com
Electronic Materials	

Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Library.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

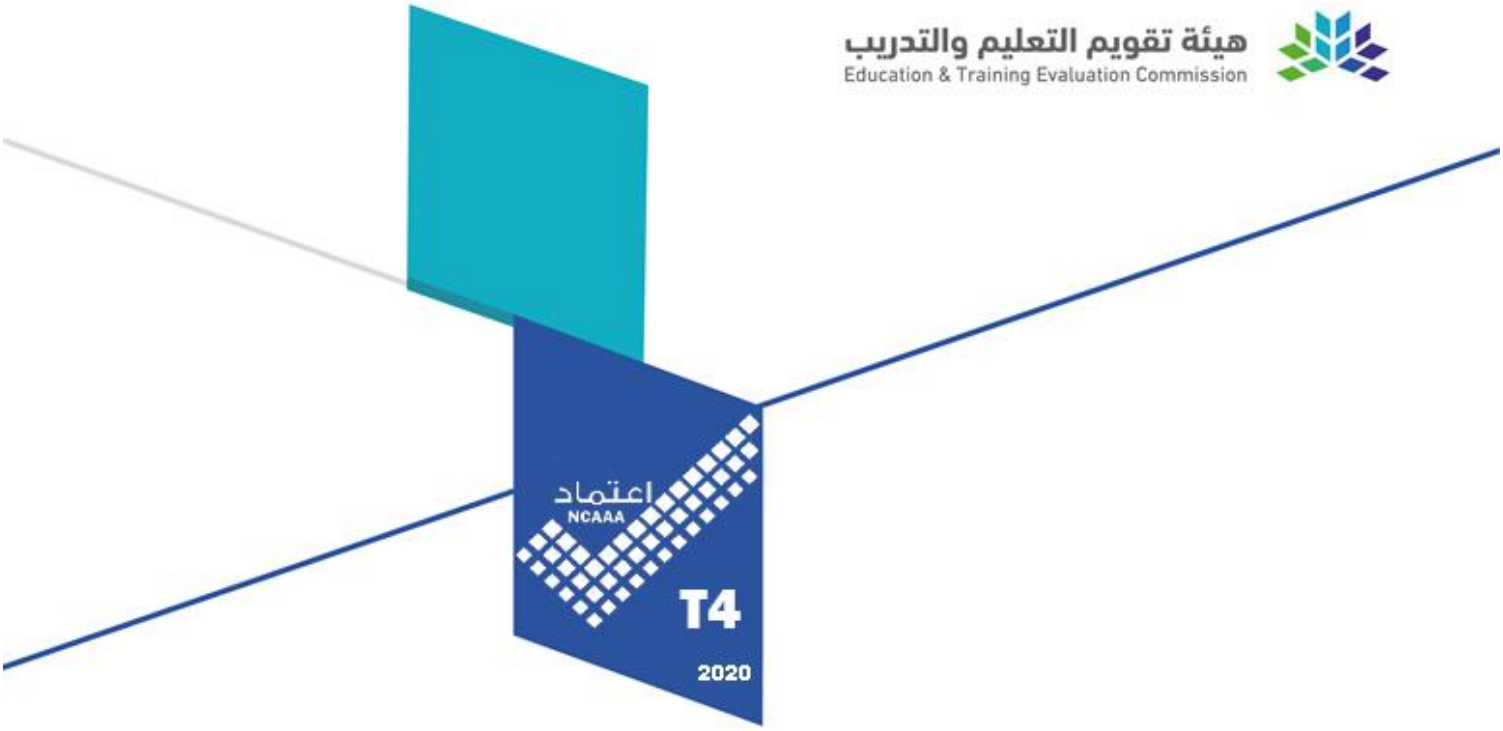
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakness areas and lack of understanding	Department/Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department / Quality Committee	Annual Program Report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Ecological Restoration**
Course Code:	
Program:	**BSc Environmental Sciences**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura university**

Table of Contents

A. Course Identification

1. Credit hours: 2
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: **Level 12 / Year 4**
4. Pre-requisites for this course (if any)**:** **- Natural resource management and environmental protection.**
5. Co-requisites for this course (if any)**:** **None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

Ecological restoration is a critical approach to repairing damage to ecosystems, and according to the mission of the Society for Ecological Restoration International, “a means of sustaining the diversity of life on Earth and reestablishing an ecologically healthy relationship between nature and culture.” Taking up from the introduction to restoration provided in ES 200, this course will give you an overview of the practice, science, and conceptual foundations of ecological restoration.

2. Course Main Objective

More specifically we will examine how effective restoration depends on both ecological and social practice, including:

• Biotic and abiotic characteristics of ecosystems from local to global scales. A special focus will be placed on understanding biodiversity patterns and processes.
• Impacts of human-induced change and how restoration evolves to address these changes.
• The context for restoration best practice.
• Significance of community involvement.
• The integral nature of a clear question and plan.
• Essential ecosystem characteristics in restoration.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Be able to articulate the historical development of restoration concepts and the role that restoration can serve in the future stewardship of natural resources.	
1.2	Be able to describe the major ecological principles underlying the successful restoration of ecosystems including concepts of disturbance and succession.	
1.3	Be able to use ecological and management principles and select appropriate methods and tools for designing and conducting restoration projects.	
1.4	Be capable of discerning elements of successful versus failed restoration projects.	
2	**Skills:**	
2.1	**Cognitive Skills:** • The ability to read a variety of different kinds of texts and materials effectively, emerging with a good understanding of their core arguments and analyses. • The ability to thoughtfully engage analyses, whether oral or written: to ask good questions, think through implications, weigh evidence, and carefully evaluate ideas and arguments. • The ability to express yourself clearly, effectively, and persuasively, both orally and in writing.	
2.2	**Interpersonal Skills and Responsibility:** At the end of the course, the student will be able to: - Be involved in self-directed learning. - Succeed in team Works. - Share and discuss results with others. - Be involved in a simple research project. - Evaluate answers and positively criticize them.	
2.3	**Communication, Information Technology and Numerical Skill** The student can propose solutions to some problems**:** - Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing.	

CLOs		Aligned PLOs
	- Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	
2.4	**Psychomotor Skills (if applicable)** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	
3	**Values:**	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3.4	- Communicate results of work to others.	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Ecological Restoration: a) Historical development.	2
2	b) Role in stewardship. c) Future needs.	2
3	Ecological Concepts: a) Ecological Succession.	2
4	b) Reference conditions.	2
5	Restoration Process: a) Steps in the Process.	2
6	***Mid-Term Exam.***	2
7	b) Understanding Limitations i) Biological Limitations. ii) Physical Limitations. iii) Chemical Limitations.	2
8	c) Overcoming Limitations (a few examples) i) Revegetation. ii) Mulching. iii) Equipment. iv) Phytoremediation. v) Collaborative Restoration.	2
9	Restoration in Various Settings (examples): a) Wetlands. b) Rivers.	2
10	c) Wildlife. d) Temperate Forests.	2
11	e) Grasslands. f) Tropical Forests.	2

12	***Final Examination.***	2
Total		24

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Be able to articulate the historical development of restoration concepts and the role that restoration can serve in the future stewardship of natural resources.	-Teaching strategies to be used to develop that knowledge. - Lectures -Take home Assignment. - Internet activities.	1. Course work reports 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final exams 4. Checking the homework assignments
1.2	Be able to describe the major ecological principles underlying the successful restoration of ecosystems including concepts of disturbance and succession.		
1.3	Be able to use ecological and management principles and select appropriate methods and tools for designing and conducting restoration projects.		
1.4	Be capable of discerning elements of successful versus failed restoration projects.		
2.0	**Skills**		
2.1	**Cognitive Skills** • The ability to read a variety of different kinds of texts and materials effectively, emerging with a good understanding of their core arguments and analyses. • The ability to thoughtfully engage analyses, whether oral or written: to ask good questions, think through implications, weigh evidence, and carefully evaluate ideas and arguments. • The ability to express yourself clearly, effectively, and persuasively, both orally and in writing.	- Lectures. - Brain storming. - Discussion. - Seminars. - Self assessment. - Examination of selected micrographs and hand drawings.	1. Course work Reports. 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final Exams. 4. Checking the homework assignments.
2.2	**Interpersonal Skills & Responsibility** - Be involved in self-directed	-Case Study. -Active learning. -Small group	-Assissent of group assignements.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	learning. - Succeed in teamwork. - Share and discuss results with others. -Be involved in simple research project. -Evaluate answers and positively criticize them.	discussion -Cooperative learning and application of scientific method in thinking the scientific problem solving. -Work as part of a team.	-Evaluate the independent assignements.
2.3	**Communication, Information Technology, Numerical** -Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	-Oral presentations. - Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
2.4	**Psychomotor:** (Description of the psychomotor skills to be developed and the level of performance **required:** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	- Follow-up students during field visits and write reports on them.	- Evaluating the laboratory written reports. - Evaluating the community participation**.**
3.0	**Values**		
3.1	- Use information and communication technology.	-Oral presentations. -Internet search assignments and essays. -Incorporating the use and utilization of	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations
3.2	-Use IT and communication technology in gathering and interpreting information and ideas.		
3.3	-Use the internet as a means of		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	communication and a source of information.	computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam.	6 th week	40 %
2	Activities.	10 th week	10 %
3	Final theory exam.	12 th week	50 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- Handouts. - Primack, Richard. 2014. Essentials of Conservation Biology. Sinauer. -Hobbs, R. J., E. S. Higgs, and C. Hall. 2013. Novel Ecosystems: Intervening in the New Ecological World Order. John Wiley & Sons.
Essential References Materials	-Falk, D.A., M.A. Palmer, & J.B. Zedler 2006. *Foundations of Restoration Ecology*. Island Press, Washington D.C. - Clewell, A. F., and J. Aronson. 2007. Ecological Restoration: Principles, Values, and Structure of an Emerging Profession. Island Press, Washington, DC. -
Electronic Materials	
Other Learning Materials	- Copies of all necessary material will be provided to the students. - Copies of additional recommended reading textbooks will be ordered at the library.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Computer laboratory might be used for software applications (homework's and design problem).
Technology Resources (AV, data show, Smart Board, software, etc.)	A combination of white board use, hand-outs, PowerPoint slide presentations, and interactive class discussions will be used. Open discussions are favored as they encourage students to participate and exchange and enhance the overall learning process.
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	A site visit may be arranged during the course.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
-Strategies for Obtaining student feedback on Effectiveness of teaching.	-The instructor or by the department.	Distribution of questionnaires for course evaluation by students. Students- faculty meetings.
- Other Strategies for Evaluation of teaching.	- The instructor or by the department.	-Data show is required in every room. -Smart Board departmental plan committee. -Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental studying plan committee.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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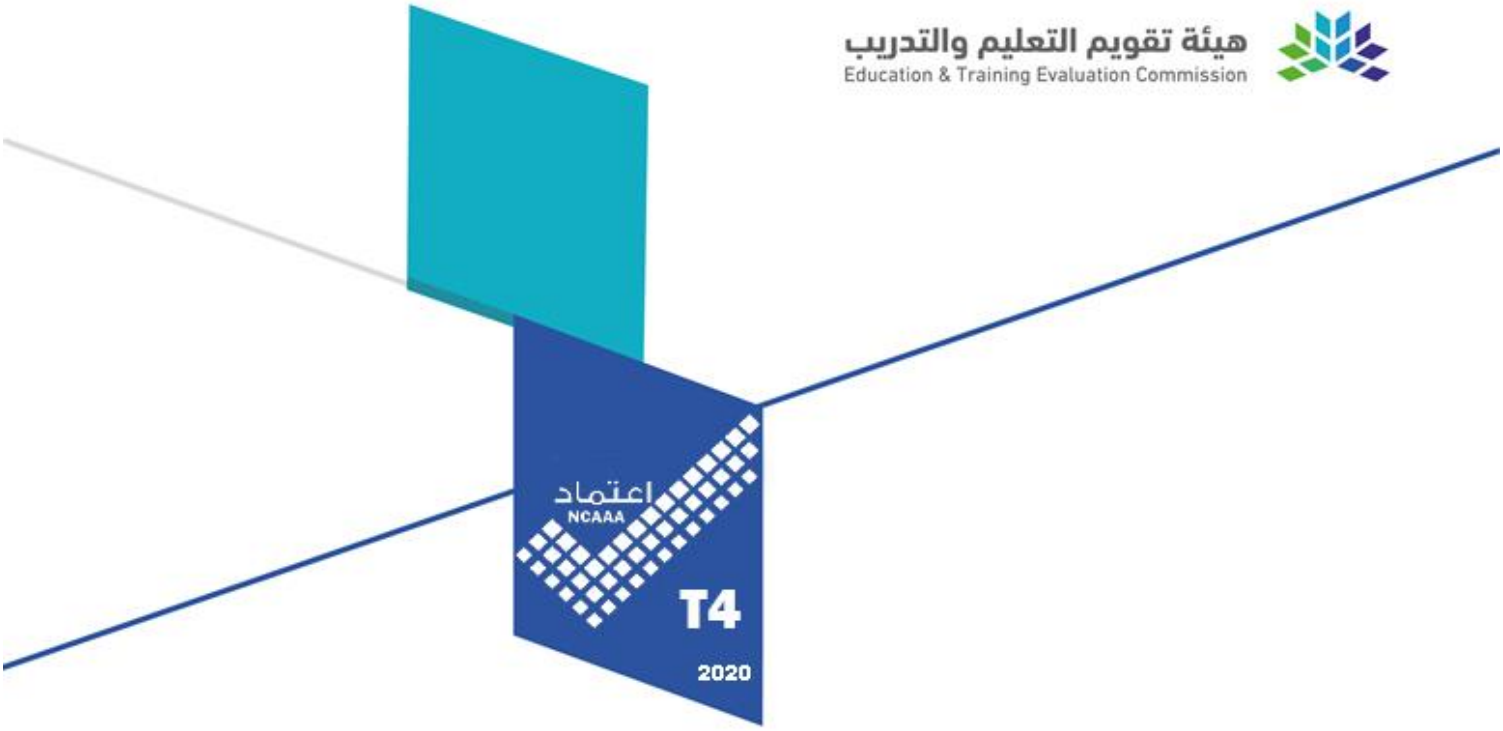
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Ecotoxicology**
Course Code:	**2hrs/ Week (2Lec.)**
Program:	**Environmental Science**
Department:	**Biology Department**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **2h.**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Tenth level, fourth year
4. Pre-requisites for this course (if any)**: Environmental monitoring and assessment**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**80%**
2	**Blended**		
3	**E-learning**		**20%**
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	
3	**Tutorial**	6h
4	**Others** (specify)	
	Total	26

B. Course Objectives and Learning Outcomes

1. Course Description

Toxicology is the study of the nature, properties, effects, and detection of toxic substances in the environment and any environmentally exposed species, including humans. This course will provide a general understanding of toxicology related to the environment. Fundamental toxicological concepts will be covered, including dose-response relationships, absorption of toxicants, distribution and storage of toxicants, biotransformation and elimination of toxicants, target organ toxicity and teratogenesis, mutagenesis, carcinogenesis and risk assessment.

2. **Course Main Objective**

The student will be able to:

- Define the basic principles of environmental health toxicology and ecotoxicology.
- Introduce the student to the systems used for classifying environmental toxicants.
- Illustrate the impact of environmental toxins on human health through specific examples
- Introduce the students to ways for examining the epidemiology of environmental toxicology.
- Illustrate the effects of toxic chemical substances and natural toxic natural substances on humans.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Demonstrate an understanding of the core concepts of the science of toxicology, including hazard identification, exposure assessment, dose-response assessment.	K1
1.2	understanding of the mechanisms of action and effects of toxic chemicals at multiple levels of biological organization.	K2
1.3	List and discuss factors influencing the toxic effects of chemicals	K3
1.4	Analyze, interpret, and evaluate health risk from exposure to a variety of chemical hazards.	K3
2	**Skills :**	
2.1	be able to collect and analyze environmental samples, perform statistical analysis of data, and interpret and present research results.	S1
2.2	combine insights from several scientific disciplines.	S1
2.3	make critical and independent assessments of methods and results.	S2
2.4	continuously develop his/her professional competence.	S1
2.5	be able to communicate subject matter and scientific results both to specialists and to a broader audience and be able to formulate scientific reasoning/argumentation.	S3
2.6	have expertise in handling chemical substances and/or biological material and understand environmental issues.	S6
3	**Values:**	
3.1	know important aspects of environmental pollution, understand this discipline's role in society, and assess ethical issues within this field.	V1
3.2	be able to acquire, evaluate and adopt relevant and reliable new information.	V4
3.3	have the background to carry out/solve advanced tasks and projects, both independently and in teams, and can assess her/his own efforts in projects.	V4
3.4	have an international perspective on her/his scientific field.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Toxicology and general principles of toxicity	2
2	Major Classes of Contaminants	4

3	Uptake, Biotransformation, Detoxification, Elimination, and Accumulation. Factors Influencing Bioaccumulation	4
4	Mid-term exam I	2
5	Hazardous Waste, Characteristics of Hazardous Waste, Sources, Classification of Hazardous Waste, effects, heavy metals definition	4
6	Acute and Chronic Lethal Effects on Individuals. Risk and Damage Assessment of Contaminants	4
7	Effects of toxic substances on humans & Midterm Exam II	2
Total		22

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Demonstrate an understanding of the core concepts of the science of toxicology, including hazard identification, exposure assessment, dose-response assessment.	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class. -Handout of lecture notes for each topic. -Small group discussions.	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports • Oral presentation
1.2	Understanding of the mechanisms of action and effects of toxic chemicals at multiple levels of biological organization.		
1.3	List and discuss factors influencing the toxic effects of chemicals		
1.4	Analyze, interpret, and evaluate health risks from exposure to various chemical hazards.		
2.0	**Skills**		
2.1	Collect and analyze environmental samples, perform statistical analysis of data, and interpret and present research results.	• Application of essential scientific techniques through lectures and essays. • Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). • Homework assignments	-Evaluation of the topics prepared by students. -Midterm and final exams -Checking the homework assignments
2.2	Combine insights from several scientific disciplines.		
2.3	Make critical and independent assessments of methods and results.		
2.4	Continuously develop his/her professional competence.		
2.5	be able to communicate subject matter and scientific results both to specialists and to a wider audience and be able to formulate scientific reasoning/argumentation.		
2.6	have expertise in handling chemical substances and/or biological material and understand environmental issues.		
3.0	**Values**		
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.		• Assignments (Individual and group)

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.		• Presentation (Individual and group) assessments. • Research search assignments

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam I	5th	20
3	Mid-term Exam II	9th	20
4	Final Exam (written test)	11th	50
5			

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.
- Laboratory assistance.
- E-mail communications.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	• Casarett and Doull's Toxicology: The Basic Science of Poisons. C.D. Klaassen, McGraw Hill, New York. (Latest edition). • Wright and Wellbourne. Environmental Toxicology. • Connell, Lam, Richardson and Wu. Ecotoxicology • Timbrell. Introduction to Toxicology
Essential References Materials	
Electronic Materials	• www.PubMed.com • http://www.sciencebuddies.org/ • The American Association for the Advancement of Science http://www.aaas.org/
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Library.

Item	Resources
Technology Resources (AV, data show, Smart Board, software, etc.)	•Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

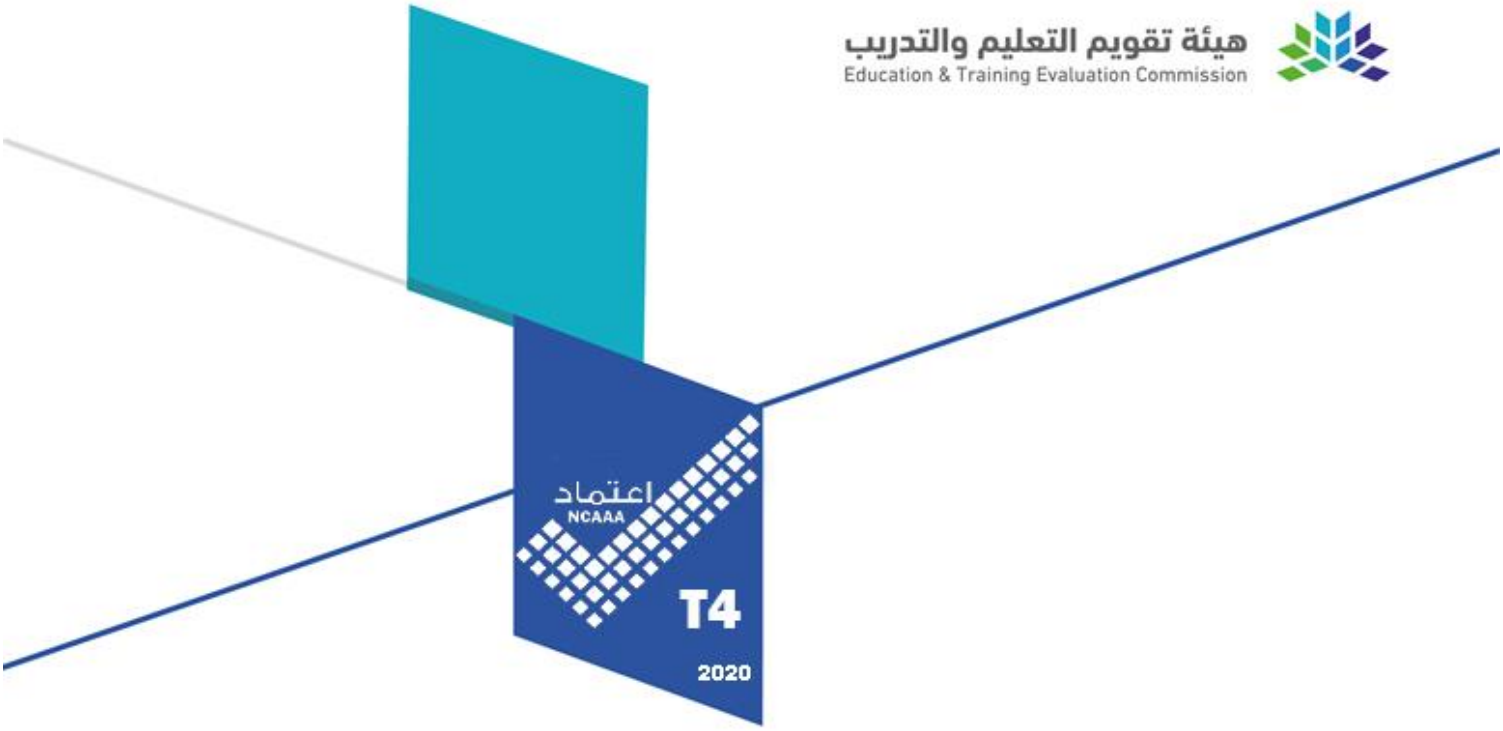
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Environmental Biotechnology
Course Code:	
Program:	B.Sc. Biology
Department:	Biology
College:	Faculty of Sciences
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours: 3 h.	
2. Course type	
a. University ☐ College ☐ Department ☑ Others ☐	
b. Required ☑ Elective ☐	
3. Level/year at which this course is offered: 4 th year – Level 12	
4. Pre-requisites for this course (if any)**:**	
Genetic and environmental interaction	
5. Co-requisites for this course (if any)**:**	
NA	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30 hrs.	50%
2	**Blended**	-	-
3	**E-learning**	-	-
4	**Distance learning**	-	-
5	**Other**	30 hrs.	50%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 hrs. (10w x 2 hrs.)
2	**Laboratory/Studio**	30 hrs. (10w x 3 hrs.)
3	**Tutorial**	2 hrs.
4	**Others** (specify)	10 hrs. including Small Group Discussion (SGD), Self-Directed Learning (SDL) and online supporting materials.
	Total	60 hrs.

B. Course Objectives and Learning Outcomes

1. Course Description

Environmental Biotechnology course describes how biotechnology has acted as a vital buffer among people, pollution, and the environment. This course explains the scientific principles of environmental biotechnologies; environmental biochemodynamic processes; environmental risk assessment; and the reduction and management of biotechnological risks. It describes ways to address environmental problems caused or exacerbated by biotechnologies. This course is mainly devoted to the contribution of biotechnology in solving environmental problems, such as biological waste water treatment, utilization of municipal sewage sludge, detoxification of polluted soil. There is examination of possible dangers release of nanomaterials into the environment. The relationship of biotechnology and energy (e.g. biogas, landfill gas fuel, photosynthetic systems for fuel production) is also discussed.

2. Course Main Objective

This course is intended to:

- Provide students with the fundamental concepts and applications of biotechnology in all aspects of environment including its restoration, sustainability, and protection.
- Teach students the aspects of microbial metabolism and microbially mediated environmental and industrial problems or processes.
- Offer the students a broad sense of understanding on how modern biotechnology is developed to achieve better environmental protection and sustainability using microbes and microbial communities in pollution abatement.
- Encourage students to participate in continuing and emerging environmental biotechnological matters.
- Integrate the theoretical knowledge with the practical skills applied in the laboratory.
- Enhance the skills of self-directed learning and investigation of scholarly articles.
- Motivate students to participate in research activities and projects.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Describe the basic principles used in the field of Environmental Biotechnology.	K1
1.2	Define the important environmental biotechnology techniques and related processes.	K2
1.3	Recognize the various applications utilizing biotechnological methods.	K2
1.4	Describe the role of microorganisms in processes such as biofilm formation, biocorrosion, mineral leaching, composting, clean drinking water.	K2 & K3
2	**Skills :**	

CLOs		Aligned PLOs
2.1	Critically analyze relevant journal articles and investigate industrial application of the above concepts.	S2
2.2	Classify microbes according to energy source and carbon source and evaluate energy outcome of the energy metabolism according to electron acceptor and electron donor usage.	S3
2.3	Describe suitable methods for characterizing the activity, function, diversity, and composition of microbial communities.	S3 & S4
2.4	Communicate effectively both orally and in writing for data analysis and consultation.	S5
2.5	Perform accurate procedures used in the operation of related apparatuses.	S1
2.6	Develop proper scholarly searching skills through scientific references.	S4 & S6
3	**Values:**	
3.1	Appraise the value of critical judgment through constructive criticism among colleagues.	V2
3.2	Demonstrate personal integrity, reliability, honesty, trustworthiness, teamwork, and ethical behavior toward others in the community.	V1& V3 & V4

C. Course Content

No	List of Topics	Contact Hours
1	Environmental Biotechnology and Sustainability.	2
2	The Environmental Implications of Biotechnology.	2
3	Principles and Applications of Environmental Biotechnology	2
4	Biological methods to redeem or mitigate the harmful effects of global pollution on the natural environment.	2
5	Phytoremediation.	2
6	Environmental Risks of Biotechnologies.	2
7	Reducing Biotechnological Risks.	2
8	Addressing Biotechnological Pollutants.	2
9	Environmental Nanobiotechnology	2
10	Environmentally friendly Bioproducts.	2
11	Review	2
Total		**22 hrs.**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Describe the basic principles used in the field of Environmental Biotechnology.	- Interactive lectures - Group discussions - Tutorials	▪ Written exams including: - Short answers - MCQs - EMQs - SAQs
1.2	Define the important environmental biotechnology techniques and related processes.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Recognize the various applications utilizing biotechnological methods.		- LAQs ▪ Assignment ▪ Open-book exam ▪ Quizzes
1.4	Describe the role of microorganisms in processes such as biofilm formation, biocorrosion, mineral leaching, composting, clean drinking water.		
2.0	**Skills**		
2.1	Critically analyze relevant journal articles and investigate industrial application of the above concepts.	- Interactive lectures - Tutorials - Practical work	▪ Written exams including: - Short answers - MCQs - EMQs - SAQs - LAQs ▪ Assignment ▪ Open-book exam ▪ Quizzes ▪ OSPE
2.2	Classify microbes according to energy source and carbon source and evaluate energy outcome of the energy metabolism according to electron acceptor and electron donor usage		
2.3	Describe suitable methods for characterizing the activity, function, diversity, and composition of microbial communities.		
2.4	Communicate effectively both orally and in writing for data analysis and consultation.		
2.5	Perform accurate procedures used in the operation of related apparatuses.		
2.6	Develop proper scholarly searching skills through scientific references		
3.0	**Values**		
3.1	Appraise the value of critical judgment through constructive criticism among colleagues.	- Tutorials - Practical work - Small group - Discussion	- Lab demonstration - Assignments - OSPE
3.2	Demonstrate personal integrity, reliability, honesty, trustworthiness, teamwork, and ethical behavior toward others in the community.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1 (Theory)	3	5%
2	Midterm examination (Theory)	5	15%
3	Midterm examination (practical)	6	10%
4	Group project	9-10	10%
5	Final examination (practical) (OSPE)	12	20%
6	Final examination (Theory)	13	40%
	TOTAL	100%	

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice: Teaching staff are available 1 hour / day, (Sun-Thu from 12:00 to 1:00 p.m)

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- Environmental Biotechnology: Principles and Applications, Second Edition 2nd Edition by Bruce Rittmann (Author), Perry McCarty (Author). - Environmental Biotechnology: Basic Concepts and Applications by Viswanath Buddolla (Author). - Environmental Biotechnology :Edition 2nd Author Daniel Vallero.
Essential References Materials	Journal of Petroleum & Environmental Biotechnology Journal of Biotechnology Microbial ecology and environmental biotechnology
Electronic Materials	Environmental Science. ALISON – online learning website. https://alison.com/courses?query=environmental%20science
Other Learning Materials	Environmental biotechnology https://journals.plos.org/plosone/browse/environmental_biotechnology

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	➢ Lecture room = 30 students ➢ Laboratory for practical = 15 students
Technology Resources (AV, data show, Smart Board, software, etc.)	➢ Computers ➢ Internet access ➢ Smart Board (preferred) ➢ Projector
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	➢ Display screen ➢ White board ➢ SDS electrophoresis tanks and its contents ➢ DNA electrophoresis tanks and its contents ➢ PCR Thermocycler ➢ UV rays for DNA visualization

G. Course Quality Evaluation

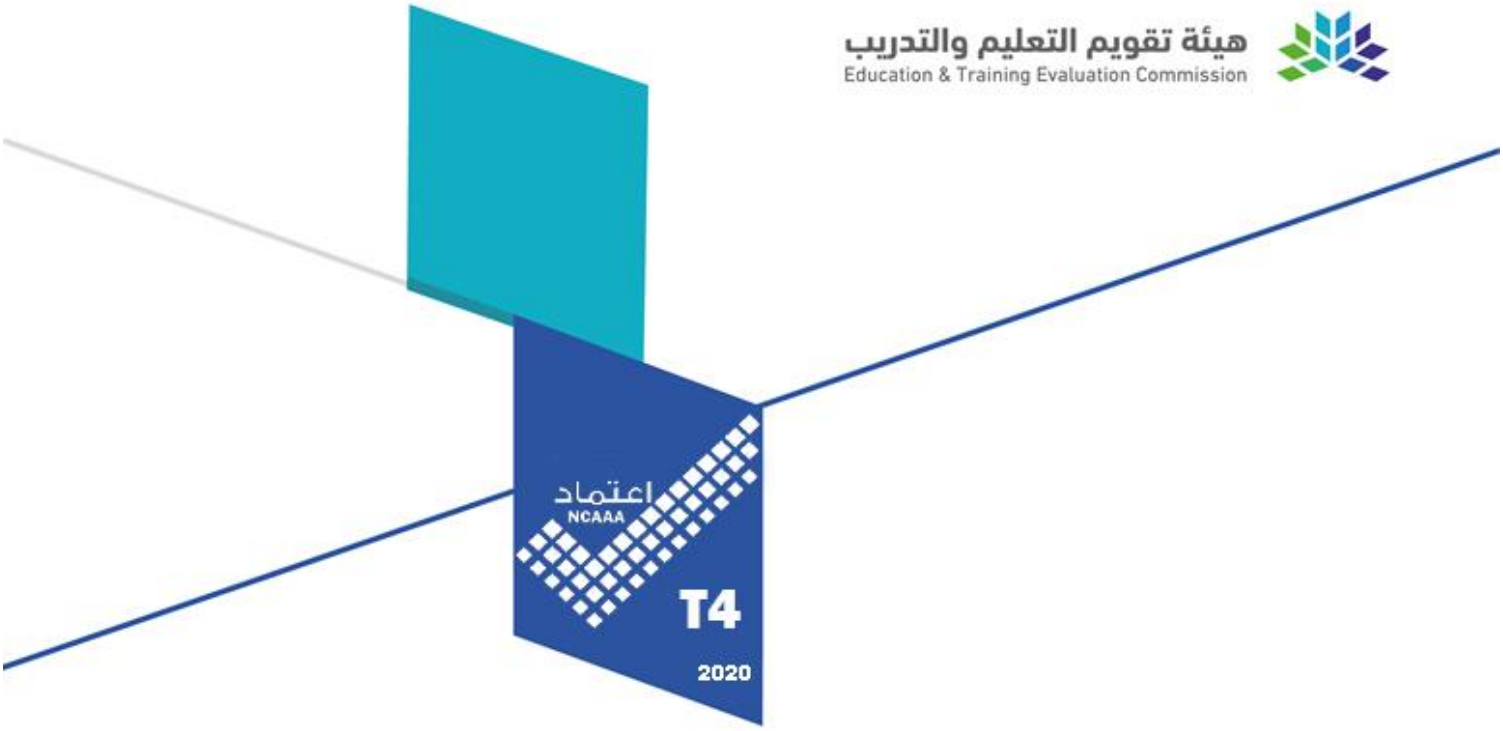
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	➢ Class discussion. ➢ Written feedback by individuals. ➢ Satisfaction survey at the end of each semester.
Extent of achievement of course learning outcomes	Course instructor Peer reviewer Program director	➢ Course development according to the analysis of student feedback. ➢ Monitoring students' performance throughout the semester using formative assessment. ➢ Analyzing students' progress. ➢ Using statistics to analyze students' achievement at the end of each semester and implement data comparison. ➢ Department council discussion. ➢ Peer evaluation of the instructor.
Quality of learning resources	Course instructor	➢ Attending staff development workshops and programs. ➢ Continuous education. ➢ Implementing student feedback. ➢ Variations of teaching strategies including tutorials, PBL and more emphasizing on the practical sessions

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Environmental GIS Applications**
Course Code:	
Program:	BSc. Environmental Sciences
Department:	Biology
College:	**Faculty of Sciences**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **2**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: 12/4
4. Pre-requisites for this course (if any)**:** Natural environments in Saudi Arabia
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	2 × 10 = 20	**100%**
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others**	
	Total	20

B. Course Objectives and Learning Outcomes

1. Course Description Effective environmental planning requires knowledge regarding Geographic Information Systems (GIS) technology. Understanding how everything is running is the first step for managing and protecting the natural environment. This course shows the importance of the use of GIS in the environmental fields. It covers subjects such as disaster management, estimation of flood damage, land use and land cover changes, management of natural resources and more. The ability of GIS for monitoring, analyzing, and modeling environmental issues and the interaction between human and natural environment are explored in the course.
2. Course Main Objective To explore the use of GIS for monitoring, analyzing, and modeling environmental issues. The advantages of big geospatial data that are obtained from different sources such as satellite images and field work (data obtained using Global Positioning System (GPS) or mobile GIS) will be also explored and discovered.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Familiarize students with the concept of GIS in the environmental field.	K^1
1.2	Understand the theory and concept of GIS and remote sensing.	K^2
1.3	Obtain a knowledge of the recent techniques of remote sensing and GIS in the environmental applications.	K^3
2	**Skills :**	
2.1	Monitor the environmental changes using satellite images.	S^3
2.1	Model the environmental disaster in the GIS platforms.	S^3
2.3	Build a geographic information system for environmental conservation.	S^4
3	**Values:**	
3.1	Demonstrates the ability to assess the natural hazards and the ability to model the disasters using GIS.	V^4
3.2	Shows the ability to incorporate different geospatial data to manage the natural resources using GIS.	V^4

C. Course Content

No	List of Topics	Contact Hours
1	GIS and Environment: Theory and concepts	**2**
2	Remote Sensing of Environment: Theory and concepts	**2**
3	GIS field work in the environmental fields: GPS and mobile GIS	**2**
4	GIS components and data types and structure	**2**
5	Remote sensing components and data types	**2**
6	The use of GIS for natural disaster	**2**
7	Land use and land cover change	**2**
8	The use of GIS for estimation of flood damage	**2**
9	The use of GIS for management of natural resources	**2**
10	Building a GIS structure for Environmental Impact Assessment (EIA)	**2**
Total		**20**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Familiarize students with the concept of GIS in the environmental field.	1. Lecturing 2. Starting with the topic outlines. 3. Demonstrate the basic principles. 5. Solve problem 6. Brain storming	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
1.2	Understand the theory and concept of GIS and remote sensing.		
1.4	Obtain a knowledge of the recent techniques of remote sensing and GIS in the environmental applications.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	**Skills**		
2.1	Monitor the environmental changes using satellite images.	Lecturing, discussion, and problem-solving.	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
2.2	Model the environmental disaster in the GIS platforms.		
2.3	Build a geographic information system for environmental conservation.		
3.0	**Values**		
3.1	Demonstrates the ability to assess the natural hazards and the ability to model the disasters using GIS.	Lecturing, discussion, and problem-solving.	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
3.2	Shows the ability to incorporate different geospatial data to manage the natural resources using GIS.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2, 4, 8, 10	20%
2	Midterm exam	6	30%
4	Final Exam	End of semester	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for the availability of faculty and teaching staff for individual student consultations and academic advice:

• Forming a committee for academic guidance.

• Determine the first week of each semester for academic advising activities.

• Activities include giving lectures on the undergraduate program by selected professors.

• Distributing brochures to bachelor's degree students.

• Supporting the student with guiding information that helps him achieve excellence in his academic performance.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Bolstad, P. (2019) *GIS Fundamentals: A First Text on Geographic Information Systems*, 6th edition, XanEdu, USA.

	Heywood, I, Cornelius, S, Carver, S. (2012) *An Introduction to Geographical Information Systems*, 4th edition, Pearson Education Limited publisher, UK.
Essential References Materials	Jensen, J., (2014) *Remote Sensing of Environment: An Earth Resource perspective*, 2nd edition, Pearson Education Limited publisher, UK. Wegmann, M., Leutner, B., Dech, S. (2016) *Remote Sensing and GIS for Ecologists Using Open-Source Software*. Pelagic Publishing, UK.
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Feedback from students regarding the effectiveness of teaching:	Course teacher	• Applying the measurement and evaluation form at the end of the semester to identify the teacher's performance and to evaluate the male/female students' performance through test results during the semester. • Actual monitoring of the student's performance in theoretical and practical training.
Evaluation of the teaching process by the professor:	Course instructor and faculty members	• Surveying of the opinions of male/female students by the professor after

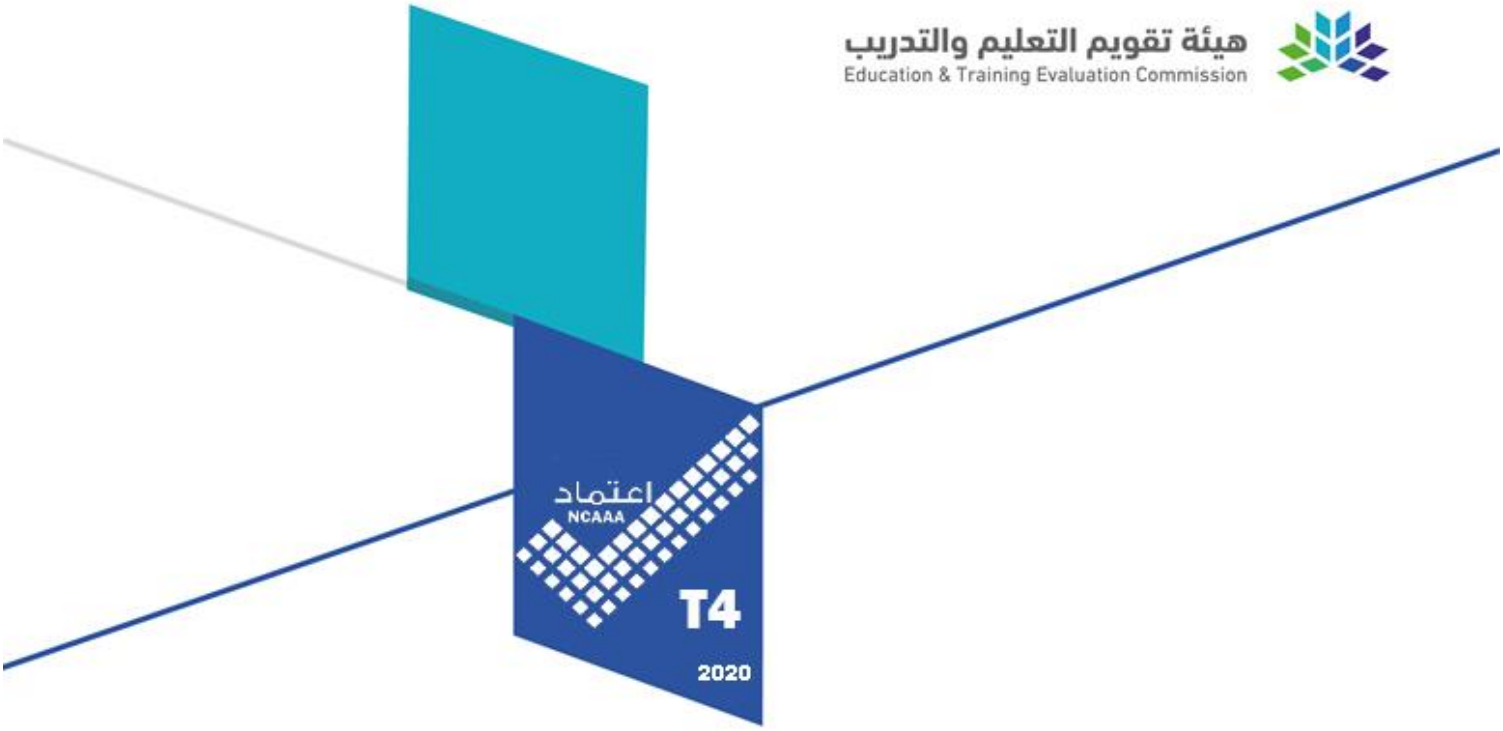
Evaluation Areas/Issues	Evaluators	Evaluation Methods
		completing each section of the course.
Teaching Development:	Course teacher	• Continuous use of computer and other technologies provided by the university, in addition to external programs and technologies. • Continuous review of the contents of the course in the light of developments in science and technology. • Updating the course content with recent information from scientific periodicals, research and foreign books.
Student achievement: Verified by:	Curriculum melody in the department	• Marking a sample of students' work by faculty members from within the department. • Consulting with faculty members regarding the composition of final exam questions and results. • Covering the course with questions in the midterm and final exams.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Environmental Law and Regulations**
Course Code:	
Program:	BSc. Environmental Sciences
Department:	Biology
College:	**Faculty of Sciences**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **2 per week**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☐ Elective ☐
3. Level/year at which this course is offered: 10/4
4. Pre-requisites for this course (if any)**:** Natural environments in Saudi Arabia
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	2 × 10 = 20	**100%**
2	**Blended**		
3	**E-learning (self-learning)**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	2 × 10 = 20
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others**	
	Total	20

B. Course Objectives and Learning Outcomes

1. Course Description This course focuses on the environmental laws and regulations whether in Saudi Arabia or worldwide. The importance of environmental protection under the Islamic law and under the national legislation is explored. It is also going to cover the historical development of environmental protection. Sanctions of breaking environmental laws in Saudi Arabia and around the world are included in this course.
2. Course Main Objective To gain in-depth and practical knowledge and skills in the application of various laws and regulations related to the national environmental protection.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	To know the historical development of the environmental protection.	K^1

CLOs		Aligned PLOs
1.2	To understand the environmental policy, legislation, and regulation.	K^2
1.3	To explore the international and national efforts to protect the environment.	K^3
2	**Skills :**	
2.1	To employ the environmental laws and regulations in the environmental protection.	S^1
2.2	To compare between international and national efforts in the environmental protection.	S^3
3	**Values:**	
3.1	Showing the awareness and responsibility for protecting the environment and keeping its components.	V^1
3.2	Suggesting the best international practices to protect the environment.	V^2

C. Course Content

No	List of Topics	Contact Hours
1	Environmental Protection: • Definition • Historical Development • Under Islamic law	**2**
2	Environmental Law: International Perspective	**2**
3	Environmental Policy, Legislation, and Regulation	**2**
4	Conservation and Ecology	**2**
5	Environmental Low in Saudi Arabia	**2**
6	Protected Areas: Planning and Management	**2**
7	Waste and Resource Management and Contaminated Land	**2**
8	Integrated Water Resources Management	**2**
9	Renewable and Energy	**2**
10	Environmental Consultancy	**2**
Total		**20**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	To know the historical development of the environmental protection.	1. Lecturing 2. Starting with the topic outlines. 3. Demonstrate the basic principles.	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
1.2	To understand the environmental policy, legislation, and regulation.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.4	To explore the international and national efforts to protect the environment.	5. Solve problem 6. Brain storming	
2.0	**Skills**		
2.1	To employ the environmental laws and regulations in the environmental protection.	Lecturing, discussion, and problem-solving.	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
2.2	To compare between international and national efforts in the environmental protection.		
3.0	**Values**		
3.1	Showing the awareness and responsibility for protecting the environment and keeping its components.	Lecturing, discussion, and problem-solving.	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
3.2	Suggesting the best international practices to protect the environment.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments	2, 4, 8, 10	20%
2	Midterm exam	6	30%
4	Final Exam	End of semester	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for the availability of faculty and teaching staff for individual student consultations and academic advice:

• Forming a committee for academic guidance.

• Determine the first week of each semester for academic advising activities.

• Activities include giving lectures on the undergraduate program by selected professors.

• Distributing brochures to bachelor's degree students.

• Supporting the student with guiding information that helps him achieve excellence in his academic performance.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Taberham, J. (2021) Global Environmental Careers: *The Worldwide Green Jobs Resource*, Wiley, UK. Vincent, P. (2008). *Saudi Arabia: An Environmental Overview*. CRC Press.

Essential References Materials	Environmental low, Ministry of Environment, Water, and Agriculture, Riyadh, Saudi Arabia
Electronic Materials	
Other Learning Materials	Ministry of Environment, Water, and Agriculture

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data Show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Feedback from students regarding the effectiveness of teaching:	Course teacher	• Applying the measurement and evaluation form at the end of the semester to identify the teacher's performance and to evaluate the male/female students' performance through test results during the semester. • Actual monitoring of the student's performance in theoretical and practical training.
Evaluation of the teaching process by the professor:	Course instructor and faculty members	• Surveying of the opinions of male/female students by the professor after completing each section of the course.
Teaching Development:	Course teacher	• Continuous use of computer and other technologies provided by the university, in addition to external programs and technologies.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
		• Continuous review of the contents of the course in the light of developments in science and technology. • Updating the course content with recent information from scientific periodicals, research and foreign books.
Student achievement: Verified by:	Curriculum melody in the department	• Marking a sample of students' work by faculty members from within the department. • Consulting with faculty members regarding the composition of final exam questions and results. • Covering the course with questions in the midterm and final exams.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Environmental monitoring and assessment**
Course Code:	
Program:	**BSc Environmental Sciences**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura university**

Table of Contents

A. Course Identification

1. Credit hours: 2
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: **Level (8) / Year (3)**
4. Pre-requisites for this course (if any)**: Environmental pollution and risk**
5. Co-requisites for this course (if any)**:** **None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

Ecological monitoring is highly quantitative and relies on models for predicting outcomes and statistics for analyzing data. Environmental scientists collect, analyze, and share information for a variety of reasons. Your specific objectives will shape your questions, which in turn, will drive your project design and methods. In the Environmental Leadership Program's (ELP) "Conservation Science in Action" projects, students collect and use information to assist our community partners with ecological research, habitat restoration, management planning, species conservation and other needs.

2. Course Main Objective

This course is designed to prepare you for your spring ELP projects by introducing you to your team, community partners, project background and protocols. We will also examine the entire process of designing and implementing a monitoring or research program. We will investigate several local case studies and gain hands-on experience using common techniques to collect,

manage, summarize, and present data. ELP projects all use common techniques to address current conservation issues, so these case studies are relevant to our course work regardless of your affiliation with a particular ELP project. In addition, we will practice some fundamental skills that all field-based environmental scientists should know.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and understanding**	
1.1	Describe how monitoring programs are used to address questions in management of populations, habitats, and ecosystems; restoration ecology; environmental remediation; and other fields.	
1.2	Outline a process for designing an effective monitoring program that is grounded in clear objectives.	
1.3	Compare and contrast local case studies to discover common themes of sampling design, sources of bias, data management, and more.	
1.4	Demonstrate how to use common monitoring tools and techniques and describe the circumstances where they are best applied.	
1.5	Identify 13-15 native plants.	
1.6	Collect and summarize accurate and useful monitoring data by implementing "best practices" for Quality Assurance/Quality Control (QA/QC).	
1.7	Search for, read, interpret, and summarize scientific literature. Utilize scientific writing to communicate results.	
1.8	Apply listening, communicating, collaborating and other interpersonal skills essential to working within team settings.	
2	**Skills:**	
2.1	**Cognitive Skills:** - The ability to design an environmental monitoring program. - How to properly use relevant equipment and implement frequently used techniques that any field scientist should know. - The ability to monitor plants to assess the success of ecological restoration or plant conservation efforts, to characterize ecological communities and as an alternative to monitoring wildlife. - Gain listening, communication, collaboration and other interpersonal skills necessary to working within team settings.	
2.2	**Interpersonal Skills and Responsibility:** At the end of the course, the student will be able to: - Be involved in self-directed learning. - Succeed in team Works. - Share and discuss results with others. - Be involved in a simple research project. - Evaluate answers and positively criticize them.	
2.3	**Communication, Information Technology and Numerical Skill** The student can propose solutions to some problems**:** - Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas.	

CLOs		Aligned PLOs
	- Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	
2.4	**Psychomotor Skills (if applicable)** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	
3	**Values:**	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3.4	- Communicate results of work to others.	

C. Course Content

No	List of Topics	Contact Hours
1	course overview - Planning a monitoring program (steps). - Why monitor? Step 1: goals, types.	2
2	- Field notebooks cont. - Step 2: Questions, scale.	2
3	- Step 3: Monitoring design – rigor.	2
4	- Step 3: Monitoring design – parameters. - Finding, using and citing and evaluating scientific literature.	2
5	- Step 3: Intensity, Qualitative Methods (with a focus on photo points).	2
6	***Mid-Term Exam.***	2
7	- Step 3: Timing, Pilot Studies. - Step 4 Sampling Scheme (basic principles of sampling).	2
8	Step 4 Sampling Scheme (basic principles of sampling cont.).	2
9	- Step 4 Sampling Scheme (sampling design).	2
10	- Step 4 Sampling Scheme (sampling design cont.). - Step 5 Implement Monitoring (QA/QC).	2
11	- Monitoring animal populations (pollinators, aquatic invertebrates).	2
12	***Final Examination.***	2
Total		24

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Using specific examples, describe how monitoring programs are used to address questions in management of populations, habitats, and ecosystems; restoration ecology; environmental remediation; and other fields.	-Teaching strategies to be used to develop that knowledge. - Lectures -Take home Assignment. - Internet activities.	1. Course work reports 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final exams 4. Checking the homework assignments
1.2	Outline a process for designing an effective monitoring program that is grounded in clear objectives.		
1.3	Compare and contrast local case studies to discover common themes of sampling design, sources of bias, data management, and more.		
1.4	Demonstrate how to use common monitoring tools and techniques and describe the circumstances where they are best applied.		
1.5	Identify 13-15 native plants.		
1.6	Collect and summarize accurate and useful monitoring data by implementing "best practices" for Quality Assurance/Quality Control (QA/QC).		
1.7	Search for, read, interpret, and summarize scientific literature. Utilize scientific writing to communicate results.		
1.8	Apply listening, communicating, collaborating and other interpersonal skills essential to working within team settings.		
2.0	**Skills**		
2.1	- The ability to design an environmental monitoring program. - How to properly use relevant equipment and implement frequently used techniques that any field scientist should know. - The ability to monitor plants to assess the success of ecological restoration or plant conservation efforts, to characterize ecological communities and as an alternative to monitoring wildlife.	- Lectures. - Brain storming. - Discussion. - Seminars. - Self assessment. - Examination of selected micrographs and hand drawings.	1. Course work Reports. 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	-Gain listening, communication, collaboration and other interpersonal skills necessary to working within team settings.		3. Midterm and final Exams. 4. Checking the homework assignments.
2.2	**Interpersonal Skills & Responsibility** - Be involved in self-directed learning. - Succeed in teamwork. - Share and discuss results with others. -Be involved in simple research project. -Evaluate answers and positively criticize them.	-Case Study. -Active learning. -Small group discussion -Cooperative learning and application of scientific method in thinking the scientific problem solving. -Work as part of a team.	-Assissent of group assignements. -Evaluate the independent assignements.
2.3	**Communication, Information Technology, Numerical** -Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	-Oral presentations. - Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
2.4	**Psychomotor:** (Description of the psychomotor skills to be developed and the level of performance **required:** -Enhancing the ability of students to use computers and internet to prepare a research article.	- Follow-up students during field visits and write reports on them.	- Evaluating the laboratory written reports. - Evaluating the community participation**.**

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	- Interpret the laboratory data.		
3.0	**Values**		
3.1	- Use information and communication technology.	-Oral presentations. -Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
3.2	-Use IT and communication technology in gathering and interpreting information and ideas.		
3.3	-Use the internet as a means of communication and a source of information.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam.	6 th week	40 %
2	Activities.	10 th week	10 %
3	Final theory exam.	12 th week	50 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1. Roni, P., M. Liermann, S. Muhar, and S. Schmutz. 2013. Monitoring and evaluation of restoration actions. 2. Kershaw, J.A. Jr., M. J. Ducey, T.W. Beers, and B. Husch. 2017. Forest Mensuration, 5th Edition. 3. Feinsinger, P. 2001. Designing field studies for biodiversity conservation.
Essential References Materials	1-Elzinga, C. L., D. Salzer, J. W. Willoughby, and J. P. Gibbs. 2001. Monitoring plant and animal populations. 2- Roni et al. 2013. Monitoring and evaluation of restoration actions. 3- Herrick et al. 2017. Monitoring manual for grassland, shrubland, and savanna ecosystems, 2nd edition. 4- Reread 2018 Climate and Phenology Research Protocol.

Electronic Materials	-For an example of field notes in ecological restoration, see https://prairieecologist.com/2012/04/17/the-value-of-field-notebooks/. -For "Maps and Map Reading" section, http://www.princeton.edu/~oa/manual/mapcompass.shtml.
Other Learning Materials	-4.5" x 7" Rite in the Rain ® notebook (mandatory; available at UO bookstore). Do not use a smaller notebook (e.g., 3" x 4.5") – it won't be big enough. - Copies of all necessary material will be provided to the students. - Copies of additional recommended reading textbooks will be ordered at the library.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Computer laboratory might be used for software applications (homework's and design problem).
Technology Resources (AV, data show, Smart Board, software, etc.)	A combination of white board use, hand-outs, PowerPoint slide presentations, and interactive class discussions will be used. Open discussions are favored as they encourage students to participate and exchange and enhance the overall learning process.
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	A site visit may be arranged during the course.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
-Strategies for Obtaining student feedback on Effectiveness of teaching.	-The instructor or by the department.	Distribution of questionnaires for course evaluation by students. Students- faculty meetings.
- Other Strategies for Evaluation of teaching.	- The instructor or by the department.	-Data show is required in every room. -Smart Board departmental plan committee. -Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental studying plan committee.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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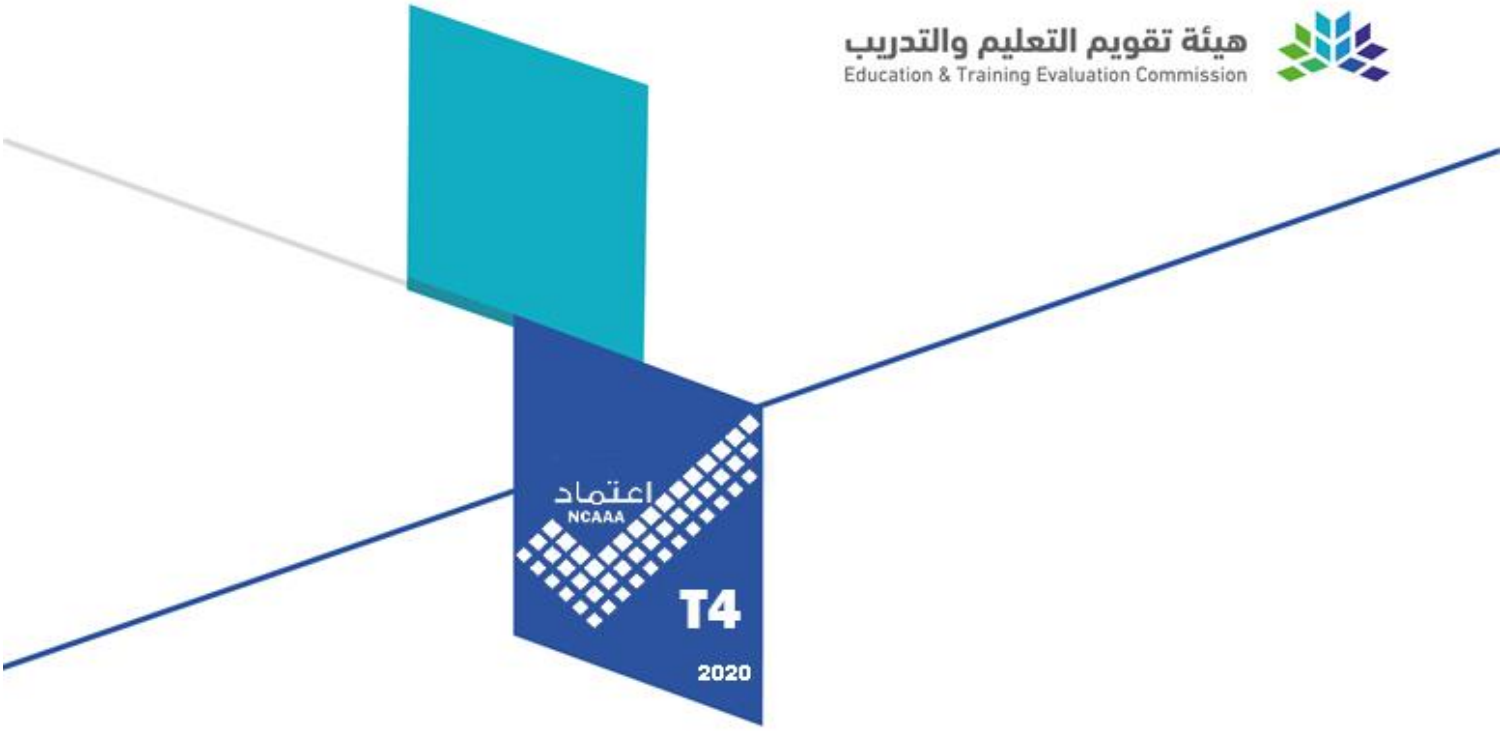
Education & Training Evaluation Commission



Course Specifications

Course Title:	Environmental Physics
Course Code:	
Program:	BSc. Environmental Sciences
Department:	Biology
College:	Applied science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 4/2
4. Pre-requisites for this course (if any)**:** General Physics 1
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30	%100
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

The course covers the basic principles of physics related to environment, like thermodynamics, energy production, light interaction with matter, as well as mass and energy transfer related to environmental systems such as atmospheric, ocean or solid earth.

2. Course Main Objective

This course aims to introduce students to the application of core physical concepts to the Earth system, with special focus on: atmospheric radiation, greenhouse gases, and pollution. The course will demonstrate how physics is fundamental to understanding natural and human influences on climate and atmospheric composition.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Define the fundamentals and basic concepts of Environmental physics.	K1
1.2	Describe the physical laws of thermodynamics, light and matter interaction, diffusion, in addition to mass and energy transfer.	K2

CLOs		Aligned PLOs
2	**Skills:**	
2.1	Solve, evaluate, or calculate the: mass and energy transfer, and effects of light and heat though different environmental systems.	S1
2.2	Explain physics concepts, processes, and results, both orally and in writing related Environmental Physics.	S1
3	**Values:**	
3.1	Cooperate responsibly and effectively within the teamwork.	V1

C. Course Content

No	List of Topics	Contact Hours
1	The Scope of Environmental Physics	2
2	Properties of Gases and Liquids	2
3	Transport of Heat, Mass, and Momentum	3
4	Transport of Radiant Energy	3
5	Radiation Environment	2
6	Radiative Properties of Natural Materials	2
7	Interception of Radiation by Plant and Animal Canopies	3
8	Momentum Transfer	3
9	Heat Transfer	2
10	Mass Transfer (Gases and Water Vapor)	3
11	Steady State Heat Balance	2
12	Transient Heat Balance	3
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1	**Knowledge and Understanding:** of the following topics		
1.1	Define the fundamentals and basic concepts of Environmental physics.	1. Lecturing 2. Starting with the topic outlines. 3. Demonstrate the basic principles. 5. Solve problem 6. Brain storming	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
1.2	Describe the physical laws of thermodynamics, light and matter interaction, diffusion, in addition to mass and energy transfer.		
2.0	**Skills:** to know how to assess, evaluate, or calculate the following:		
2.1	Solve, evaluate, or calculate the: mass and energy transfer, and effects of light and heat though different environmental systems.	Lecturing, discussion, and problem-solving.	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
2.2	Explain physics concepts, processes, and results, both orally and in writing related Environmental Physics.		
3	**Values:** to practice and interact the safety culture related to:		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.1	Cooperate responsibly and effectively within the teamwork	1. Presentations 2. Scientific reports and team projects.	Reports and presentations evaluation.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Weekly quizzes	Through term	10
2	Homework	Through term	10
3	Mid Exam	6	30
4	Final Exam	12	50

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
Consultation and/or academic advice will be available during the teaching staff office hours

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1. John L. Monteith† and Mike H. Unsworth. Principles of Environmental Physics: Plants, Animals, and the Atmosphere. 3rd Edition. 2011. John Wiley & Sons, Ltd.
Essential References Materials	1. Nigel Mason and Peter Hughes. Introduction to Environmental Physics. 2001 by Taylor & Francis Group, LLC. 2. j. Jeffrey Peirce, Ruth F. Weiner, and P. Aarne Vesilind. Environmental Pollution and Control. 4rd Edition. 1997. Elsevier Science & Technology Books. 3. Kyle Forinash. Foundations of Environmental Physics. 2010. Island Press. 4. Peter Smithson, Ken Addison and Ken Atkinson. Fundamentals of the Physical Environment. 4th edition. 2008. Taylor & Francis Group.
Electronic Materials	EPA Publications
Other Learning Materials	https://www.epa.gov/environmental-topics/air-topics https://ec.europa.eu/environment/index_en

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Traditional Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show

Item	Resources
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NA

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course content	Instructor, students	Questionnaire.
Effectiveness of teaching Strategies	Students, Program administrator	Questionnaire
Quality of learning resources	Instructor, Peer Reviewer	Course report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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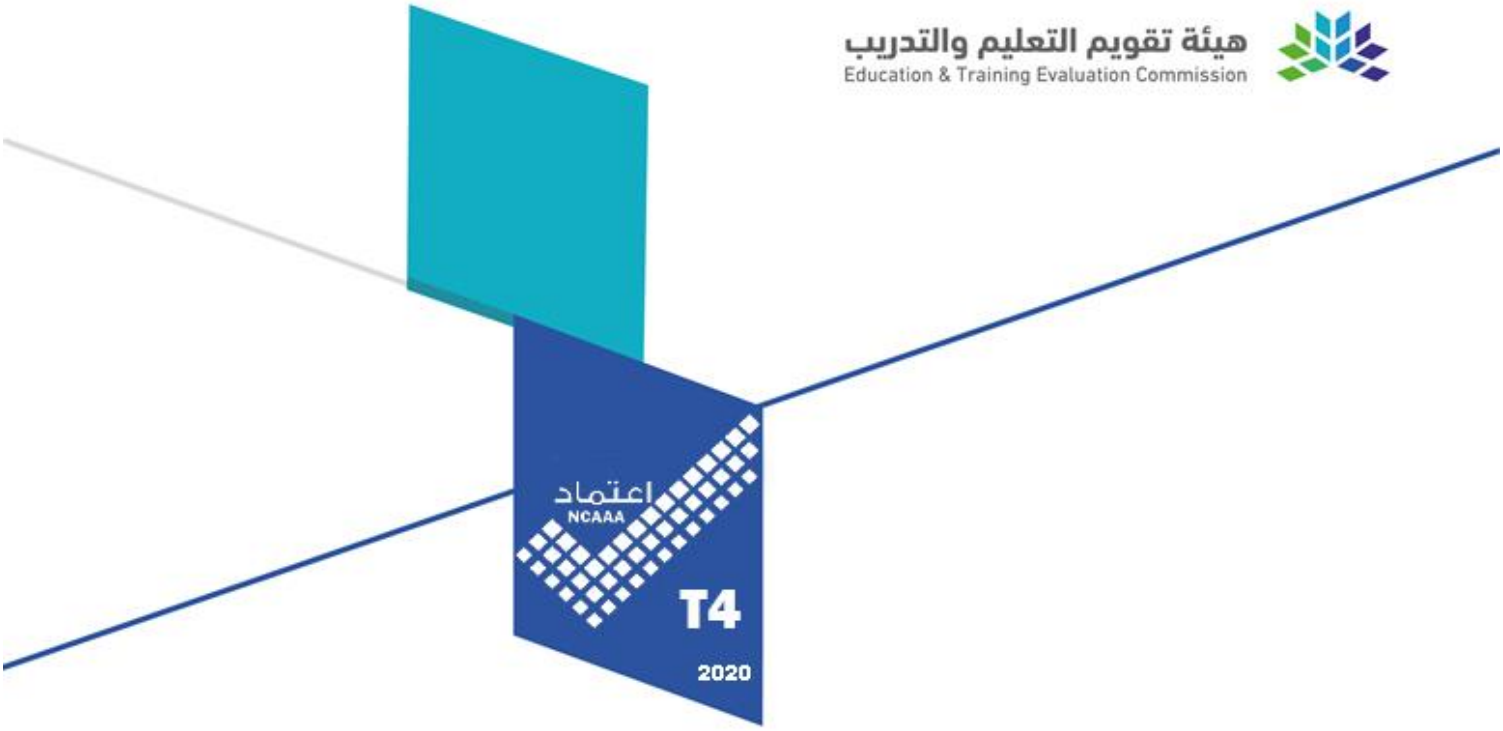
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Experimental design and methodology**
Course Code:	
Program:	**BSc Environmental Sciences**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura university**

Table of Contents

A. Course Identification

1. Credit hours:	**2**
2. Course type	
a.	University ☐ College ☐ Department ■ Others ☐
b.	Required ■ Elective ☐
3. Level/year at which this course is offered:	**Level (11) / Year (4)**
4. Pre-requisites for this course (if any)**:**	**- Sampling and analysis of environmental contamination.**
5. Co-requisites for this course (if any)**:**	**None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course is aimed at examining the applied issues of designing experiments and performing statistical analyses to reach justified scientific conclusions. The approach will rigorously address the mathematical underpinnings of statistical tests and modeling through applied examples. Efficient and appropriate experimental design approaches will be integrated with statistical analysis techniques.

A wide range of topics will be covered to provide a “one stop” overview of statistics for the engineer. This includes data visualization, hypothesis formulation, inferential statistics (e.g. t-test), briefly correlation and (multiple) regression, uncertainty and confidence intervals, ANOVA (fixed effects, random effects, and mixed), ANOVA derived methods (e.g. ANCOVA, Nested designs), post-hoc comparisons and corrections, diagnostics and remedial measures, and best practices for reporting statistics in publication.

2. Course Main Objective

1. Describe the three major characteristics of a scientific experiment.
2. Calculate variance and standard deviation from a data set.
3. Perform a t-test to determine whether means are significantly different.
4. Explain the difference between CRD, RCB, and LS.
5. Be able to select the correct error term when performing an F-test on the effects of selected sources of variation.
6. Explain the assumptions necessary to perform an ANOVA.
7. Construct a regression analysis table to describe the relationship between two variables.
8. Describe the appropriate ways to transform data that are not normally distributed.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and understanding**	
1.1	Knowledge of different statistical methods.	
1.2	Awareness and knowledge of the role of biostatistics in scientific complexes and researchers.	
1.3	Knowledge of statistical processes and their analysis based on different designs.	
1.4	Students will be able to design a factorial greenhouse experiment with two levels of factor A and three levels of factor B, and perform a correct ANOVA on a set of dummy data.	
2	**Skills:**	
2.1	**Cognitive Skills:** -The ability to acquire scientific and practical skills in statistical operations -The ability for the student to acquire the skills of displaying statistical tables. -The ability to familiarize the student with statistical processes and to plan and implement appropriate experiments and to analyze them statistically based on different designs.	
2.2	**Interpersonal Skills and Responsibility:** -At the end of the course, the student will be able to searches for information.	
2.3	**Communication, Information Technology and Numerical Skill** The student can propose solutions to some problems**:** - The ability to analyze and formulate data and information. - Communicate and communicate with the relevant authorities when collecting information.	
2.4	**Psychomotor Skills (if applicable)** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	

CLOs		Aligned PLOs
3	**Values:**	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3.4	- Communicate results of work to others.	

C. Course Content

No	List of Topics	Contact Hours
1	- Experimental Principles, Basic Statistics.	2
2	- Data Summary, Normal Distribution.	2
3	- t –Distribution, Confidence Intervals. - Hypothesis Testing, Comparisons of Two Means (receive Test 1).	2
4	- Linear Regression, Multiple Regression. - Analysis of Variance (ANOVA) (Test 1 due).	2
5	- Completely Randomized Design (CRD) Receive test 2 - Randomized Complete Block (RCB) Design	2
6	***Mid-Term Exam.***	2
7	- Latin Square (LS), Factorial Experiments. - Comparison of Multiple Treatment Means, Other Mean Comparisons (Test 2 due).	2
8	- Assumptions, Data Transformation. - Missing Values, Split Plot Designs.	2
9	- Comparing Regression Lines, Analysis of Covariance.	2
10	- Analysis of Counts, Non-Parametric Methods.	2
11	- Proc NPAR1WAY, Proc Mixed, GLIMMIX.	2
12	***Final Examination.***	2
Total		24

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Knowledge of different statistical methods.	-Teaching strategies to be used to develop that knowledge. - Lectures -Take home Assignment. - Internet activities.	1. Course work reports 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final exams 4. Checking the homework assignments
1.2	Awareness and knowledge of the role of biostatistics in scientific complexes and researchers.		
1.3	Knowledge of statistical processes and their analysis based on different designs.		
1.4	Students will be able to design a factorial greenhouse experiment with two levels of factor A and three levels of factor B, and perform a correct ANOVA on a set of dummy data.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	**Skills**		
2.1	Cognitive Skills: -The ability to acquire scientific and practical skills in statistical operations -The ability for the student to acquire the skills of displaying statistical tables. -The ability to familiarize the student with statistical processes and to plan and implement appropriate experiments and to analyze them statistically based on different designs.	- Lectures. - Brain storming. - Discussion. - Seminars. - Self assessment. - Examination of selected micrographs and hand drawings.	1. Course work Reports. 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final Exams. 4. Checking the homework assignments.
2.2	**Interpersonal Skills & Responsibility** -Enhancing the ability of students to use computers and internet to prepare a research article. -Interpret the laboratory data.	-Case Study. -Active learning. -Small group discussion -Cooperative learning and application of scientific method in thinking the scientific problem solving. -Work as part of a team.	-Assissent of group assignements. -Evaluate the independent assignements.
2.3	**Communication, Information Technology, Numerical** -The student can propose solutions to some problems. -The ability to analyze and formulate data and information. -Communicate and communicate with the relevant authorities when collecting information.	-Oral presentations. - Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
2.4	**Psychomotor:** -Enhancing the ability of students to use computers and internet to		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	prepare a research article. - Interpret the laboratory data**.**	- Follow-up students during field visits and write reports on them.	- Evaluating the laboratory written reports. - Evaluating the community participation**.**
3.0	**Values**		
3.1	- Use information and communication technology.	-Oral presentations. -Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
3.2	-Use IT and communication technology in gathering and interpreting information and ideas.		
3.3	-Use the internet as a means of communication and a source of information.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam.	6 th week	40 %
2	Activities.	10 th week	10 %
3	Final theory exam.	12 th week	50 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- **Steel, R. G. D. and Torrie, J. H. (2001).** Principles and Procedures of Statistics with Special Reference to the Biological Sciences. Mc Graw Hill ,N.Y.,USA. 4th edition**.** -**Clewer, A.G. and D.H. Scarisbrick. 2001.** Practical Statistics and Experimental Design for Plant and Crop Science. John Wiley and Sons, LTD. New York

Essential References Materials	--**Qunin, G. P. and Keough, M. J. (2002).** Experimental Design and Data Analysis for Biologists. Melbourne University Press.
Electronic Materials	"Applied Linear Statistical Models" by Kutner, Nachtsheim, Neter, and Li, can be found here: http://users.stat.ufl.edu/~rohitpatra/4210/KNNL.pdf
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Computer laboratory might be used for software applications (homework's and design problem).
Technology Resources (AV, data show, Smart Board, software, etc.)	A combination of white board use, hand-outs, PowerPoint slide presentations, and interactive class discussions will be used. Open discussions are favored as they encourage students to participate and exchange and enhance the overall learning process.
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	A site visit may be arranged during the course.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
-Strategies for Obtaining student feedback on Effectiveness of teaching.	-The instructor or by the department.	Distribution of questionnaires for course evaluation by students. Students- faculty meetings.
- Other Strategies for Evaluation of teaching.	- The instructor or by the department.	-Data show is required in every room. -Smart Board departmental plan committee. -Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental studying plan committee.

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

H. Specification Approval Data

Council / Committee	

Reference No.	
Date	

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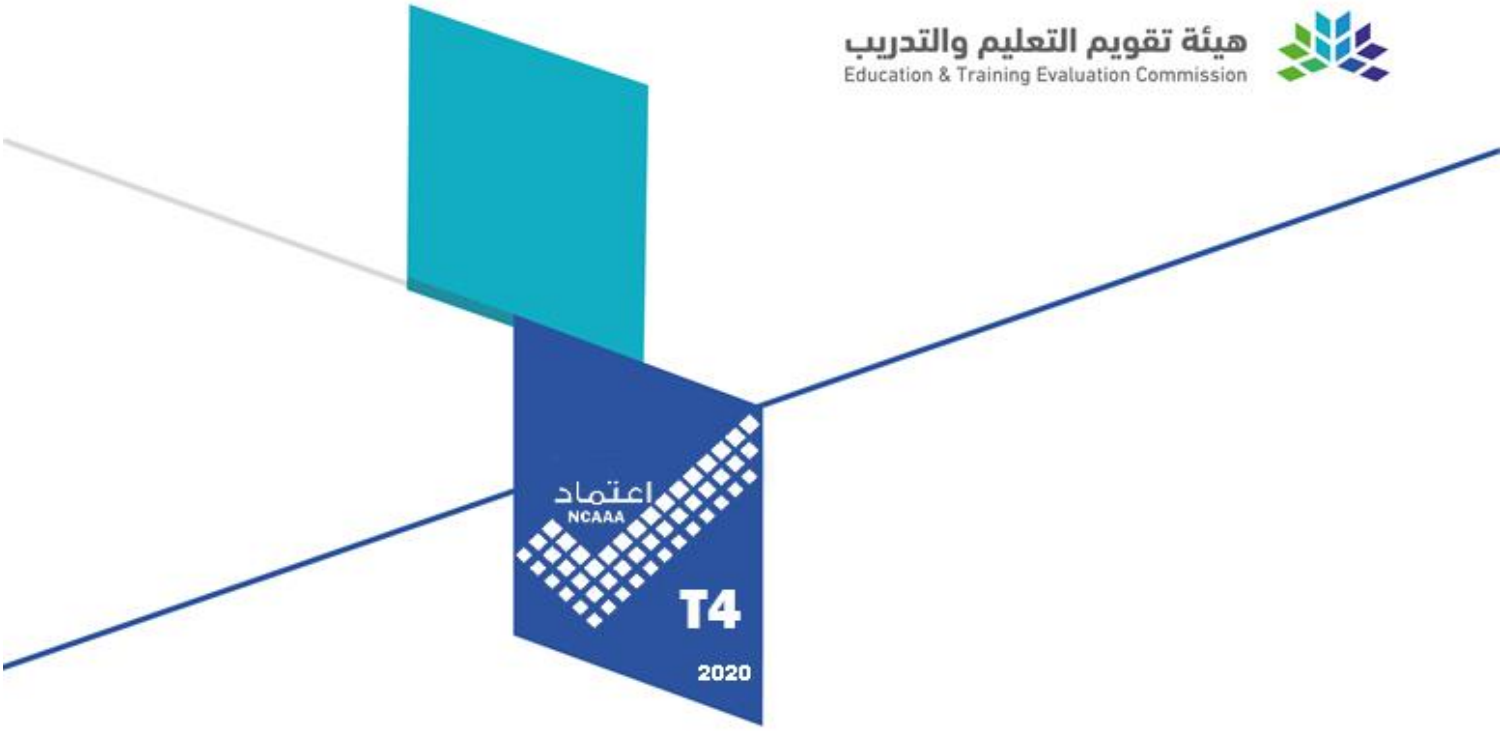


Course Specifications

Course Title:	**Fauna**
Course Code:	
Program:	**BSc Environmental Sciences**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura university**

Table of Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: **Level (5) / Year (2)**
4. Pre-requisites for this course (if any)**: - Natural environments in Saudi Arabia.**
5. Co-requisites for this course (if any)**:** **None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	16
3	**Tutorial**	
4	**Others** (specify)	
	Total	36

B. Course Objectives and Learning Outcomes

1. Course Description

The course is described based on coverage of the following topics: The course gives the student a clear idea about the wildlife of most wild animals including marine animals and birds in Saudi Arabia, and ability to adapt to different environments in the Kingdom, with special emphasis on the external characteristics of these animals and breeding periods and seasons.

2. Course Main Objective

After completing this course, students should be able to:

- Define the principles and concepts of biodiversity (representative marine and terrestrial species).
- Surveys the deferent ecosystems, habitats, distribution within the wildlife, endemic and endangered species in the western region of Saudi Arabia.

- Students will learn applied techniques through a combination of lectures, labs, and field trips.
- Students will collect and describe the morphological and morphometric parameters of the collected samples belonging to different animal families to design simple identification key to classify the collecting samples.
- Consideration of biological taxonomic systems and consideration of both vegetative features and reproductive features associated with local fauna.
- Students will train to work in team and gain experience about collection skills, using traps and other tools during collection.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Identify the unknown species using morphological characters and the main taxonomic basis that studied in previous courses (invertebrate and vertebrate).	
1.2	Employ recent communication and information technologies effectively in different tasks related to animal ecology.	
1.3	Learn the morphological and specific internal structures the different species that collected or observed in different Saudi a habitats.	
1.4	Distinguish the diversity and distribution of obtained species in their habitats. Then Be aware about the proper and applied ways deal with the sample collection from terrestrial and aquatic environments.	
1.5	Be able to clearly and concisely speak about and write about the morphological, morphometric parameters to identify the proper classification of the collected species, in addition, comments, record and describe specific internal structures (palatal and pharyngeal teeth, gill rakers, swim bladder, stomach and intestinal food) to know their habitat, types and nature of their food.	
1.6	Learn how to Apply or design and identification key for orders, families or species diversity, as well as, interpret and discuss the obtained data as presentation.	
1.7	Draw the collected species and write the specific terms and measurements for each body region to calculate the mean organ-somatic indices for the collected samples such as: diameter of eye wings, legs, bills or the diameter of ear opening and total body length. In special cases, it is necessary to investigate and describe some anatomical structure that help in classification.	
1.8	Comprehend the methods and application of collection and record distribution map of collected sample for each habitat.	
1.9	Enumerate the characteristics of different wild or aquatic habitats in Arabian Peninsula.	
2	**Skills:**	
2.1	**Cognitive Skills:** - Using the morphology and morphometric to diagnose the systematic position of collected samples. - Identify collecting samples according to the published keys of vertebrate classes, orders and families, then use the to develop a special key for Arabian species. - Distinguish the common characters of orders, families and species and apply them to configure an accurate key to orders, families or	

CLOs		Aligned PLOs
	species represented in an ecosystem. - Define the distribution of different samples in their habitat. - Apply a strategy to study animal fauna of local regions. - Employ recent communication and information technologies effectively to investigate biodiversity in local habitat of Makkah regions. - Discuss the distribution and relationships between animal fauna and their environments. - Team work activities: Draw, Describe the collected, then discuss this field work as a presentation activity. - Use the personal skills, tools and traps to collect terrestrial or aquatic samples.	
2.2	**Interpersonal Skills and Responsibility:** At the end of the course, the student will be able to: - Be involved in self-directed learning. - Succeed in team Works. - Share and discuss results with others. - Be involved in a simple research project. - Evaluate answers and positively criticize them.	
2.3	**Communication, Information Technology and Numerical Skill** The student can propose solutions to some problems**:** - Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	
2.4	**Psychomotor Skills (if applicable)** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	
3	**Values:**	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3.4	- Communicate results of work to others.	

C. Course Content

No	List of Topics	Contact Hours
1	-The concept of biodiversity. The study of the topography, the climate and site of geographical. - Animal species of KSA in terms of their characteristics, geographic distribution and densities.	2
2	A brief summary to explain the basic fauna and rare animals that resident and migratory, exotic and endangered.	2
3	Morphology of representative marine fauna, in term of special structure that will be used to classify the obtained species form field. Field trip to collect marine fauna during weak end.	2
4	How to design simple identification key to identify marine fauna. Apply key steps to classify the collected species.	2
5	Morphology of representative terrestrial invertebrate fauna, in term of special structure that will be used to classify the obtained species form field.	2
6	***Mid-Term Exam.***	2
7	How to design simple identification key for terrestrial invertebrate fauna. Apply key steps to classify the collected species.	2
8	Morphology of representative vertebrate fauna, in term of special structure that will be used to classify the obtained species form field. Field trip 2 during the week end.	2
9	How to design simple identification key for Arabian vertebrate fauna. Apply key steps to classify the collected species.	2
10	How to design and apply keys to orders of Arabian Fishes, amphibians	2
11	How to design and apply keys to orders of Arabian reptiles, birds and mammals.	2
12	***Final Examination.***	2
Total		24

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Identify the unknown species using morphological characters and the main taxonomic basis that studied in previous courses (invertebrate and vertebrate).	1. Lectures and student research papers. 2. The using of visual display such as PowerPoint. 3. Homework assignments.	- Homework and Quizzes. - Midterm and final written exams. - Evaluation of reports.
1.2	Employ recent communication and information technologies effectively in different tasks related to animal ecology.		
1.3	Learn the morphological and specific internal structures the different species		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	that collected or observed in different Saudi a habitats.	Discussions (connecting what they learn in the class and applying this information in laboratory).	- Group discussions and participation in the lecture. Course work reports.
1.4	Distinguish the diversity and distribution of obtained species in their habitats. Then Be aware about the proper and applied ways deal with the sample collection from terrestrial and aquatic environments.		
1.5	Be able to clearly and concisely speak about and write about the morphological, morphometric parameters to identify the proper classification of the collected species, in addition, comments, record and describe specific internal structures (palatal and pharyngeal teeth, gill slits, swim bladder, stomach and intestinal food) to know their habitat, types and nature of their food.		
1.6	Learn how to Apply or design and identification key for orders, families or species diversity, as well as, interpret and discuss the obtained data as presentation.		
1.7	Draw the collected species and write the specific terms and measurements for each body region to calculate the mean organo-somatic indices for the collected samples such as: diameter of eye wings, legs, bills or the diameter of ear opening and total body length. In special cases, it is necessary to investigate and describe some anatomical structure that help in classification.		
1.8	Comprehend the methods and application of collection and record distribution map of collected sample for each habitat.		
1.9	Enumerate the characteristics of different wild or aquatic habitats in Arabian Peninsula.		
2.0	**Skills**		
2.1	**Cognitive Skills** -The ability to know the general characteristics of marine vital areas. -The ability to be aware of the environmental factors - chemical,	1. Interactive lectures. 2. Seminars.	- Exam must contain questions that can measure these skills. - Quiz and exams.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	physical and biological - which affect the marine environment. -The ability to be aware of nektonic and benthic communities in the marine environment. -The ability to understand the interrelationships between animals and the marine environment -The ability to identify and classify marine organisms. -The ability to know the equipment used in collecting the local marine fauna. -Ability to evaluate field trips and related experiences. -The ability to comprehend the economic importance of the natural resources of the sea. -The ability to develop an understanding of the human impact on the balance of nature in marine environments.	3. Participation of students in discussions during the lecture. 4. Trying to explain the issues in regular and motivated manner. Follow up the students in lab and during carryout all analytical techniques.	- Discussions after the lecture. Practical exam.
2.2	**Interpersonal Skills & Responsibility** Tackle sufficient practical skills appropriate to the discipline under study to ensure competence.	- Lecture and Assignments.	-Quizzes Student evaluation by teacher.
2.3	**Communication, Information Technology, Numerical** - Employ the internet and electronic databases as a source of information and a mean of communication.	Lecture , Assignments and group discussions.	-Evaluating the problems solutions. -Evaluating the oral discussions in the class. -Assessment the laboratory written reports and presentation.
2.4	**Psychomotor:** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	-Follow up students the students in lab and during carryout all the laboratory experiments	-Evaluating the laboratory written reports. -Evaluating the community participation.
3.0	**Values**		
3.1	- Use information and communication technology.	-Oral presentations. -Internet search assignments and essays. -Incorporating the use	-Evaluation of student essays and assignments. -Marks given to for good reports and
3.2	-Use IT and communication technology in gathering and interpreting information and ideas.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.3	-Use the internet as a means of communication and a source of information.	and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam.	6 th week	20 %
2	Activities.	10 th week	10 %
3	Final practical exam.	11 th week	30 %
3	Final theory exam.	12 th week	40 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1-Adnan Mohamed Haji ,Introduction to the fauna of Saudi Arabia, Al Safa Press, 1413 AH. 2 -A series of folders fauna of Saudi Arabia, Meteorology and Environmental Protection, Ministry of Defence and Aviation. 3 -Nabil Zaki Zahid, Khaled Bakr Kamal, and Gerald Groemer, General Zoology , vertebrate and invertebrate ,1426 4- Mohammad Hassan Hamoud, ,Vertebrate Biology: the national center of publication and distribution, Jordan
Essential References Materials	
Electronic Materials	Scientific search engines on the internet.
Other Learning Materials	Web sites, U Tubes. Scientific videos and films.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Class rooms are already provided with data show. • Laboratory necessity. • Reduce the number of students in class rooms. • Computer laboratory might be used for software applications (homework's and design problem).
Technology Resources (AV, data show, Smart Board, software, etc.)	A combination of white board use, hand-outs, PowerPoint slide presentations, and interactive class discussions will be used. Open discussions are favored as they encourage students to participate and exchange and enhance the overall learning process.
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	- Microscopes - Animal dissection tools - Animal dissection board - Microscope slides and strips - Alcohol, formaldehyde and cotton - A site visit may be arranged during the course.

G. Course Quality Evaluation

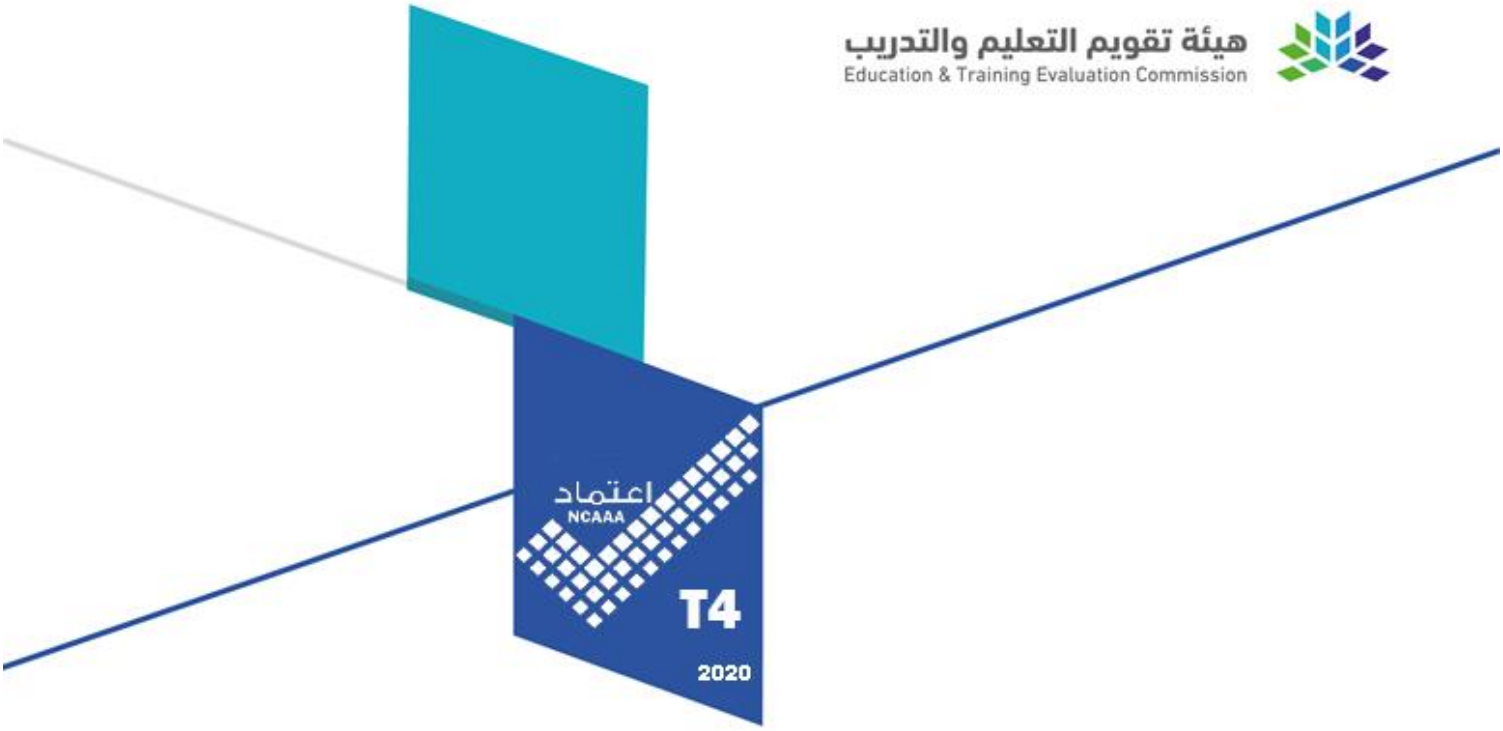
Evaluation Areas/Issues	Evaluators	Evaluation Methods
-Strategies for Obtaining student feedback on Effectiveness of teaching.	-The instructor or by the department.	Distribution of questionnaires for course evaluation by students. Students- faculty meetings.
- Other Strategies for Evaluation of teaching.	- The instructor or by the department.	-Data show is required in every room. -Smart Board departmental plan committee. -Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental studying plan committee.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Flora of KSA**
Course Code:	**2hrs/ Week (2Lec.)**
Program:	**Environmental Science**
Department:	**Department of Biology**
College:	**Faculty of Science**
Institution:	**UMM AL – QURA UNIVERSITY**

Table of Contents

A. Course Identification

1. Credit hours: **3**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Level 5, Second year
4. Pre-requisites for this course (if any)**:** Natural environments in Saudi Arabia
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**70%**
2	**Blended**		
3	**E-learning**		**10%**
4	**Distance learning**		**10%**
5	**Other**		**10%**

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	7 h.
3	**Tutorial**	
4	**Others** (specify)	3 h. field trip
	Total	30 h.

B. Course Objectives and Learning Outcomes

1. Course Description This course study Flora of KSA, which is the plant life occurring in a particular region or time, generally the naturally occurring or indigenous, native plant, native life. Also, this course introduces the students to the concept of Herbarium and Botanical Garden, Role and Importance in the Science of Flora. It is provide an overview of Phytogeographical regions of saudi arabia. The approaches to the study of phytogeography. Furthermore this course give a student information about Floristic Composition and Main Vegetation Types of Saudi Arabia,
2. Course Main Objective - illustrate the plant geographical systems - define geographical aspects of the Kingdom of Saudi Arabia as part of the global geo-plant - characterize the life of the various wild plants and their growth under environmental and climatic conditions

- training students to collect plant specimens and the different ways to dried and conservation. the development of industrial taxonomic keys

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	-Identifying the meaning of flora	
1.2	-Identify the different phytogeographical regions of the Kingdom	
1.3	- distinguish types of environments and plant populations	
1...		
2	**Skills :**	
2.1	-Collect information from more than one source	
2.2	- presentation of information and results through the use of computer	
2.3	-the ability to drying and preservation of plant species in scientific ways	
2...		
3	**Values:**	
3.1	- create a spirit of cooperation, understanding, respect and responsibility	
3.2	- work in groups to improve the skills of relationship with others	
3.3	- cooperation in solving the problems of the students in the 3compilation of scientific material	
3...		

C. Course Content

No	List of Topics	Contact Hours
1	**Introduction and Principles of Flora**: Concepts; Definition of flora, Classification of plant species according to their origin status. Documentation of floras; Traditional Floras, Electronic Floras (e-Flora).	2
2	**Herbarium and Botanical Garden, Role and Importance in the Science of Flora:** The herbarium; Definition, Historical Overview, The Largest Herbaria in the World, Roles of a Herbarium, Digitization of Herbaria. Botanical Gardens; Definition, Types of plants in botanical gardens, Historical Overview, Roles of a Botanical Garden, Herbaria and botanical gardens in Saudi Arabia.	2
3	**Plants Geography (Phytogeography)**; What is plant geography? What are the factors affecting the distribution of the plant? What is the importance of the study of phytogeography? Phytogeographical background. Floristic realms in the world. Phytogeographical regions in the middle east. Phytogoeghraphy of saudi arabia. The approaches to the study of phytogeography.	2
4	**Plant Communities:** Definition, Scales of Biological Variation, Global scale communities, Biome Types, Local scale communities, Characteristics, Dominance, Structure, Description, Classification	2
5	**Midterm exam**	2
6	**The Plant Life Forms**:	2

	Definition, Raunkiaer's plant life form system, Phanerophytes, Chamaephytes, Cryptophytes, Therophytes, Hemicryptophytes, The importance of the study of plant life forms, Life form in different biomes. with examples of plants KSA	
7	**Identification Keys:** The methods of identification include; Expert determination, Comparison, The use of identification key, DNA Barcoding	2
8	**Overview on Flora Saudi Arabia**: History of the Floristic Investigation of Saudi Arabia, Overview of the Saudi Arabian Flora , Floristic Composition, Trees and shrubs, Halophytes, Aquatic plants, Monocot Flora , Endemism in Saudi Arabia.	2
9	**Vegetation Types of Saudi Arabia and Indicator Plant Species**: Main Vegetation Types of Saudi Arabia, Deserts and other scarcely vegetated areas, Dwarf shrublands and related communities. Coastal plains, Topography, Phytogoeghraphy and climate, Vegetation types, Wadies. Mountain Highlands, Topography, Phytogoeghraphy, Climate, Montane woodlands and xeromorphic shrublands	6
Total		22

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Identify the different geographical regions of the Kingdom and characterize every form of plant life in the different areas Distinguish types of environments and plant populations	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class. -Handout of lecture notes for each topic . -Small group discussions.	-Homework and Quizzes. -Midterm and inal exams -Evaluation of reports -Oral presentation
2.0	**Skills**		
2.1	Collect information from more than one source Presentation of information and results through the use of computer The ability to drying and preservation of plant species in scientific ways	-The use of computers and the internet. -Small group discussion -Ask the students to dry plant samples of local flora -Class discussions (Engage students in interaction with questions and answers).	E-valuation of the topics and reports prepared by students. -Assess the students in practical lessons. -Checking the homework assignments

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		-Homework assignments -Field trip	
3.0	**Values**		
3.1	create a spirit of cooperation, understanding, respect and responsibility work in groups to improve the skills of relationship with others cooperation in solving the problems of the students in the 3compilation of scientific material	-The ongoing discussions in the lecture hall. -The duties assigned to the students. -The division of students into groups for making research and discuss topics.	-Estimate the student response to the assigned of doing tasks. -Presentation (Individual and group) assessments. -Measuring the extent of student learning through tests and discussions.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam	6th	20
3	Quiz	8th	10
4	Search and Reports	9th	20
5	Final Exam (written test)	12th	40

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Office hours: 10 hrs.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Lectures notes prepared by faculty member specializes in flora KSA
Essential References Materials	• Chaudhary S (1999) Flora of the Kingdom of Saudi Arabia: illustrated. Ministry of Agriculture Water, National Herbarium, National Agriculture Water Research Center • Sheila collenette (1999): An Illustrated Guide to the flowers of Saudi Arabia. Scorpion Publishing Ltd, Victoria House, Buckhurst Hill, England.

Electronic Materials	Plant Diversity in Saudi Arabia: http://www.plantdiversityofsaudiarabia.info/index.htm E Flora of the Kingdom of Saudi Arabia https://floraofksa.myspecies.info
Other Learning Materials	Web sites, U Tubes. Scientific videos and films.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Librar • Lab and herbarium
Technology Resources (AV, data show, Smart Board, software, etc.)	• Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• Simple and compound microscope. • A computer and a data show. • Well identified herbarium samples representing the flora of the Kingdom of Saudi Arabia

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Revised March 2022

Course Title:	**Fundamental of Microbiology**
Course Code:	
Program:	**Environmental Science Program**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**UM AL – QURA UNIVERSITY**
Revision Date	**March 2022**

Table of Contents

A. Course Identification

1. Credit hours: 3 hours
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ■ Elective ☐
Level/year at which this course is offered: **First Year / Level 3**
4. Pre-requisites for this course (if any)**:** **General Biology**
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**30**	**50 %**
2	**Blended**		**-**
3	**E-learning**		**-**
4	**Correspondence**		**-**
5	**Other**	**30**	**50 %**

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	**30**
2	**Laboratory/Studio**	**42**
3	**Tutorial**	**-**
4	Practical/Field work/Internship	**6**
5	**Others** (specify)	**30**
	Total	**102**
Other Learning Hours*		
1	**Study**	**30**
2	**Assignments**	**8**
3	**Library**	**15**
4	**Projects/Research Essays/Theses**	**10**
5	**Others** (specify)	**-**
	Total	**63**

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

In this course, introduction about general microbiology; including historical background. General characteristics of prokaryotic cells, different between the prokaryotes and Eukaryotes cells, an overview about the beneficial and hazardous roles of microorganisms in the environment and their applications in different fields, distribution of microorganisms in the environment, short discerption about the different microorganisms (bacteria, cyanobacteria, fungi, Actinomycetes, protozoa, viruses), Bacterial cell morphology and structure, Factors affecting microbial activity and growth, Control of microbial activity including the different sterilization methods will be covered. Furthermore, some applications of microbiology (Soil microbiology, water and sewage microbiology, food and dairy microbiology) will be discussed.

2. Course Main Objective

- **After completing this course students should be able to:**
- List the major types of Microorganisms in the environment
- Describe the general characteristics of prokaryotic microorganisms
- Discuss the positive and negative roles of the microorganisms in the environment
- Differentiate between prokaryotic and eukaryotic cells
- List the factors affecting the growth of microorganisms
- Analyze requirements of microbial growth.
- Explain why some microorganisms live well in some extreme environments
- List different methods of sterilization and understand which on suitable for sterilizing any material.
- List different bacterial cell morphologies.
- Understand the roles of microorganisms in soil
- Understand the roles of microorganisms in water contamination
- Understand the roles of microorganisms in water contamination
- Understand the roles of microorganisms in foods

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
	❖ Having successfully completed the course students should be • Understand the general characteristics of prokaryotes • List the major types of Microorganisms in the environment • List the benefits and hazardous roles of the microorganisms in the environment and life. • Differentiate between prokaryotic and eukaryotic cells • List the factors affecting the growth of microorganisms • List different methods of sterilization and understand which on suitable for sterilizing any material. • List different bacterial cell morphologies • List the roles of microorganisms in soil, water and foods	

	CLOs	Aligned PLOs
	•	
2	**Skills:**	
2.1	**Cognitive skills to be developed** ❖ Having successfully completed the course students should be able to: • Differentiate between prokaryotic and eukaryotic cells • Analyze requirements of microbial growth. • Explain why some Gram-positive bacteria become Gram-negative stain sometimes during Gram staining • Explain why some microorganisms live well in some extreme environments and others couldn't. • Understand the roles of microorganisms in soil • Understand the roles of microorganisms in water contamination • Understand the roles of microorganisms in foods.	
2.2.	**Psychomotor Skills** ❖ Upon successful completion of this course, the student is expected to be able to: • Perform the laboratory experiments precisely • Operate all devices in lab • Isolation and subculturing the important microorganisms from soil and rhizosphere.	
3	**Values:**	
	❖ Upon successful completion of this course, the student is expected to be able to: • Developing oral presentations. • Communicating personal ideas and thoughts. • Work independently and as part of a team to finish some assignments. • Communicate results of work to others. • Use of needed precautions when dealing with pathogen microorganisms • Demonstrate professional attitudes and behaviors towards others. • Propose the smart questions • Understand and dissecting the problem so that it is fully solved understood. • Demonstrate the assertiveness for his decision. • Demonstrate his capability for the responsibility and Accountability • Show Effective verbal communication with clarity and must be characterize with the following interpersonal attributes; (verbal communication, Non-verbal communication, good listening for the others, questioning, good manners, problem solving, Social awareness, self-management, responsibility and accountability) • Enhancing the ability of students to use computers and internet. • Interpret the laboratory data. • Know how to write a report.	

C. Course Content

No	List of Topics	Contact Hours
1	❖ **History of microbiology:** - introduction about general microbiology; including historical background. - General characteristics of prokaryotic cells, differentiation between the prokaryotes and Eukaryotes cells. - an overview about the beneficial and hazardous roles of microorganisms in the environment and their applications in different fields.	2
2	❖ **Short discerption about the microorganisms and their roles on the soil and plants:** - Distribution of microorganisms in the environment, type of microorganisms in the environment. -Short discerption of Bacteria, cyanobacteria, fungi, Actinomycetes, protozoa, viruses.	4
3	❖ **Bacterial cell morphology and structure**	2
4	❖ **Factors affecting microbial activity and growth.**	2
5	❖ **Control of microbial activity including the different sterilization methods**	2
6	**Midterm Exam**	2
7	❖ **Applied Microbiology** A short background of soil Microbiology	4
8	❖ **Applied Microbiology** - A short background of Water and sewage microbiology	4
9	❖ **Applied Microbiology** - A short background of Food and dairy microbiology	4
10	**Final Exam**	2
	Total	**28hrs**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	❖ Having successfully completed the course students should be • Understand the general characteristics of prokaryotes	• Lectures which must start with preliminary one showing course contents • Using images and movies	• Periodical exam and reports 10% • Mid- term theoretical exam 20%

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	• List the major types of Microorganisms in the environment • List the benefits and hazardous roles of the microorganisms in the environment and life. • Differentiate between prokaryotic and eukaryotic cells • List the factors affecting the growth of microorganisms • List different methods of sterilization and understand which on suitable for sterilizing any material. • List different bacterial cell morphologies List the roles of microorganisms in the soil, water, and foods	• Studying microorganisms from different environmental specimens in the lab. • Encouraging students to collect new information about different important microorganisms in soil, water, and foods samples • Enable the reference books and scientific sites concerning soil microorganisms on the internet.	• Mid-term practical exam 5% • Final practical exam 15% • Final exam 50%
2.0	**Skills**		
2.1	**Cognitive skills to be developed** ❖ Having successfully completed the course students should be able to: • Differentiate between prokaryotic and eukaryotic cells • Analyze requirements of microbial growth. • Explain why some Gram-positive bacteria become Gram-negative stain sometimes during Gram staining • Explain why some microorganisms live well in some extreme environments and others couldn't. • Understand the roles of microorganisms in soil	• Lectures. • Brain storming. • Discussion.	• Exam must contain questions that can measure these skills. • Quiz and exams. • Discussions after the lecture.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	• Understand the roles of microorganisms in water contamination Understand the roles of microorganisms in foods.		
2.2	**Psychomotor Skills** ❖ Upon successful completion of this course, the student is expected to be able to: ❖ Perform the laboratory experiments precisely ❖ Operate all devices in the lab ❖ Perform aseptic microbiological techniques. ❖ Preparation different media for isolation and cultivation of bacteria ❖ Cultivate the bacterial isolates on the agar plate	- Follow up students the students in lab and carry out all the laboratory experiments	-Giving additional marks for the students they have accurate laboratory results and good seminar presentation -Practical exam.
2.3			
3.0	**Values:**		
	❖ Upon successful completion of this course, the student is expected to be able to: • Developing oral presentations. • Communicating personal ideas and thoughts. • Work independently and as part of a team to finish some assignments. • Communicate results of work to others. • Use of needed precautions when dealing with pathogen microorganisms • Demonstrate professional attitudes and behaviors towards others. • Propose the smart questions • Understand and dissect the problem so that it is fully solved understood. • Demonstrate the assertiveness for his decision. • Demonstrate his capability for the responsibility and Accountability • Show Effective verbal communication with clarity and	- Lab work - Case Study - Active learning - Small group discussion - Homework (preparing a report on some topics related to the course depending on web sites). - Seminars presentation - Practical during carryout the experiments in the lab.	- Oral exams. - Evaluate the efforts of each student in preparing the report. - Evaluate the scientific values of reports. - Evaluate the work in team - Evaluation of the role of each student in lab group assignment - Evaluation of students presentations

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	must be characterized with the following interpersonal attributes; (verbal communication, Non-verbal communication, good listening for the others, questioning, good manners, problem-solving, social awareness,self-management, responsibility, and accountability) • Enhancing the ability of students to use computers and the internet. • Interpret the laboratory data. • Know how to write a report.		

2. Assessment Tasks for Students

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Exam duration	Proportion of Final Assessment
1	**Periodical Exam (s)**	**3**	**15 min**	**10 %**
2	**Mid Term Exam (Theoretic)**	**6**	**60 min**	**20 %**
3	**Mid Term Exam (practical)**	**6**	**30 min**	**10 %**
4	**Reports and essay**	**11**	**--**	**5 %**
5	**Final Practical Exam**	**13**	**60 min**	**15 %**
6	**Final Exam**	**14**	**120 min**	**40 %**
			Total Marks	**100%**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Office hours: 10hrs.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1-Brock Biology of Microorganisms, Twelfth edition by Madigan, Martinko, Dunlap and Clark; Publisher: Pearson Prentice-Hall, ISBN: 0132324601 (2008). -Benson, H.J. (2002). Microbiological Applications. Laboratory Manual in General Microbiology, eighth edition. 2-Prescott, L., Harley, J. and Klien, D. (2005). Microbiology, MacGraw 3-Larry McKane & Judy Kandel (1996) Microbiology– Essential and Applications, International Edition.
Essential References Materials	- Saad Zaky Mahmoud (1988). Practical Applied Microbiology, Egyptian Anglo.
Electronic Materials	• **PPT prepared by Prof. Dr. Khaled Elbanna**
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Class room is already provided with data show • The area of class room is suitable concerning the number of enrolled students (68) and air conditioned
Technology Resources (AV, data show, Smart Board, software, etc.)	• Digital lab containing 15 computers.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• Incubators, autoclaves, measuring equipment, water bath, digital balances, pH meters, safety facilities. • Availability of some reference bacterial strains • Cultural media and all chemical that needed

G. Course Quality Evaluation

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching • **Questionaries** • **Open discussion in the class room at the end of the lectures.**
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department • **Revision of student answer paper by another staff member.** • **Analysis the grades of students.**
3. Processes for Improvement of Teaching • **Preparing the course as PPT.** • **Using scientific movies.**

• **Coupling the theoretical part with laboratory part** • **Periodical revision of course content.**
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • **After the agreement of Department and Faculty administrations**
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • **Periodical revision by Quality Assurance Units in the Department and institution**

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

H. Specification Approval Data

Council / Committee	Prof. Dr. Khaled Elbanna, professor of microbiology and biotechnology
Reference No.	
Date	**March 2022**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Fundamentals of Organic chemistry**
Course Code:	**Not yet defined**
Program:	**Environmental Science**
Department:	**Chemistry**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 3h. (2 theoretical + 1 Practical)
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: 4th level/ 2nd year
4. Pre-requisites for this course (if any)**: General Chemistry**
5. Co-requisites for this course (if any)**:** -----

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**	---	---

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	30
3	**Tutorial**	--
4	**Others** (specify)	6
	Total	56

B. Course Objectives and Learning Outcomes

1. Course Description

This course is designed to provide background in the fundamentals of nomenclature, mechanisms, structures, and synthesis of carbon-based compounds. This course is designed for biology and environmental science majors who desire a general rather than a detailed knowledge of the compounds of carbon.

2. Course Main Objective

By the end of this course student will be familiar with the basic principles of organic chemistry including nomenclature, physical, chemical properties, and preparations of different families of organic compounds and biomolecules in addition to an introduction to isomerism and stereochemistry.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Name and classify the organic compounds.	K1
1.2	Recognize the physical, chemical properties and applications of organic compounds.	K2
1.3	Explain the mechanism of reactions of organic compounds and their transformations based on the theoretical background.	K2
2	**Skills:**	
2.1	Apply the IUPAC rules for nomenclature of organic compounds.	S1
2.2	Predict the expected product and mechanism of different reactions of aliphatic compounds.	S2
2.3	Explain the different strategies for preparation of organic compounds.	S1
2.4	Practice chemical processes and techniques for identification and investigation of different classes of organic compounds.	S3
2.5	Use computers and internet to find all information related to organic biomolecules and their importance.	S6
3	**Values:**	
3.1	Write and present a chemical report related to the importance of organic compound.	V4
3.2	Work individually and in a team to perform a specific experiment or preparing a report on the environmental impact of organic compounds.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Structure, bonding and reactivity in organic molecules.	2
2	Nomenclature, physical, chemical properties, and preparations of different classes of aliphatic and aromatic hydrocarbons and their biological importance.	4
3	Introduction to isomerism and stereochemistry.	2
4	Nomenclature, reactivity and used of organic halogen compounds.	4
5	Nomenclature, physical, chemical properties, and preparations of different families according to functional groups including alcohols, ethers, amines, carbonyl compounds, carboxylic acids and their derivatives	4
	Nomenclature, physical, chemical properties, and preparations of different families of biomolecules including carbohydrates, lipids, amino acids and proteins.	4
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Name and classify the organic compounds.	• Lectures	• Quiz. • Final and mid-term exam.
1.2	Recognize the physical, chemical properties and applications of organic compounds.	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab exam
1.3	Explain the mechanism of reactions of organic compounds and their transformations based on the theoretical background.	• Lectures	• Quiz. • Final and mid-term exam.
2.0	**Skills**		
2.1	Apply the IUPAC rules for nomenclature of organic compounds.	• Lectures • Web based study.	• Quiz. • Final and mid-term exam. • Assignments and activities
2.2	Predict the expected product and mechanism of different reactions of aliphatic compounds.	• Lectures	• Quiz. • Final and mid-term exam.
2.3	Explain the different strategies for preparation of organic compounds.	• Lectures	• Quiz. • Final and mid-term exam. • Lab exam
2.4	Practice chemical processes and techniques for identification and investigation of different classes of organic compounds.	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab exam
2.5	Use computers and internet to find all information related to organic biomolecules and their importance.	• Lectures • Web based study.	• Quiz. • Final and mid-term exam. • Assignments and activities
3.0	**Values**		
3.1	Write and present a chemical report related to the importance of organic compound.	• Lab work • Library visit.	• Quiz. • Lab report
3.2	Work individually and in a team to perform a specific experiment or preparing a report on the environmental impact of organic compounds.	• Lab work • Library visit.	• Assignments and activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	--	10 %
2	First Periodic Exam.	5	20 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Practical Exam.	11	30 %
4	Final Exam.	12	40 %
5	Total	100 %	

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- We have faculty members to provide counselling and academic advice.
- 2 hours per week as office hours are available for discussion with the students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• John McMurry's "Organic Chemistry, 8th edition, International Edition" 2011, Brooks/Cole. • Amit Arora "Introductory Organic Chemistry" 2006, Discovery Publishing House New Delhi • John McMurry's "Organic Chemistry, 8th edition, International Edition" 2011, Brooks/Cole. • T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder "Organic Chemistry, 11th Edition, International Student Version" 2013, John Wiley & Sons.
Essential References Materials	• Lecture Handouts available on the coordinator website
Electronic Materials	• http://www.chemweb.com • http://www.sciencedirect.com • http://www.rsc.org
Other Learning Materials	• Microsoft Power Point, Excel and Microsoft Word • Professional standards or regulations and software • Computer-based programs/CD

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms capacity (30) students. • Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Room equipped with computer and projector and TV
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	------

G. Course Quality Evaluation

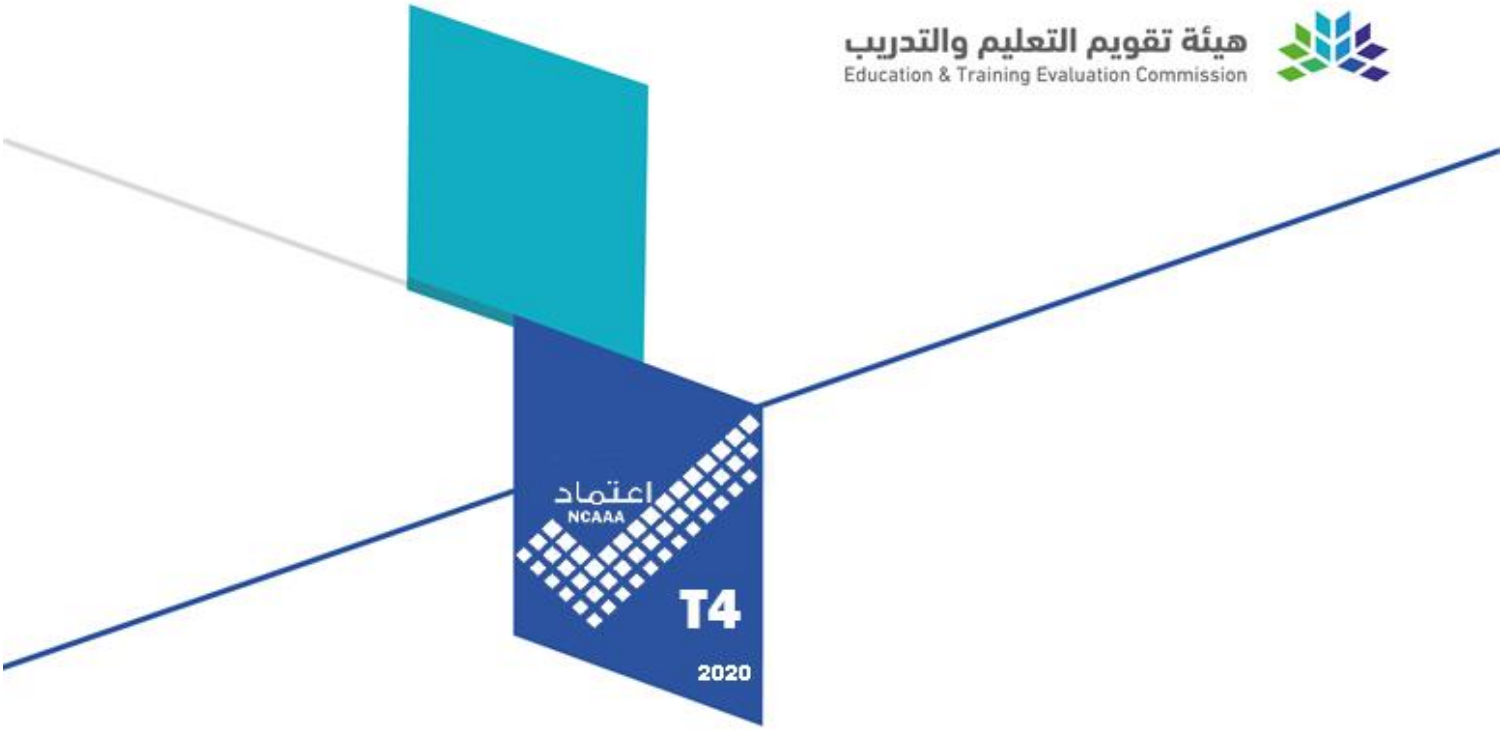
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty Indirect (feedback from faculty and students).
Quality of learning resources	Students	Direct (feedback from faculty). Indirect (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	02.04.2022

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	General Chemistry 1
Course Code:	
Program:	All Chemistry tracks - Industrial Chemistry – Physics - Medical Physics – Biology – Microbiology – Mathematics- Environmental
Department:	Department of chemistry
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ■ Department ☐ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: Level 1/ 1st year
4. Pre-requisites for this course (if any)**: -**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	**100%**
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	27
3	**Tutorial**	
4	**Others** (specify)	6
	Total	63

B. Course Objectives and Learning Outcomes

1. Course Description

This course is an introductory chemistry course designed to prepare students for college level chemistry courses.

2. Course Main Objective

The course introduces some basic principles of physical, organic and inorganic chemistry.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Familiar with the International system of units	K1
1.2	Write the electronic configuration of different elements	K1
1.3	Familiar with the atomic structure	K1
1.4	List the factors affecting equilibrium position and equilibrium concentration.	K1
1.5	List the various types of chemical reaction	K1

CLOs		Aligned PLOs
1.6	Recognize and know which elements in the Periodic Table	K2
1.7	familiar with the terms hydrocarbons, organic compounds containing oxygen and nitrogen atoms	K2
2	**Skills :**	
2.1	Predict molecular formulas using empirical formulas and molecular masses.	S1
2.2	Explain trends in the Periodic Table as they relate to Atomic Size, Ionization Energy and Electron Affinity.	S1
2.3	Calculate the concentration of a solution from the volume and the mass, or moles, of solute	S1
2.4	Calculate the pH of acids and bases	S2
3	**Values:**	
3.1	**Ability to communicate results of work to classmates.**	V4
3.2	**Communicate effectively with his lecturer and colleagues**	V3

C. Course Content

No	List of Topics	Contact Hours
1	Units of measurements; SI- units, intensive and extensive properties, uncertainty in measurements (precision and accuracy). Introduction: Matter and measurements	3
2	Significant figures: Using significant figures in addition, subtraction, multiplication and divisions.	3
3	States of matter and measurement, molecules and molecular compounds.	3
4	The periodic table, electronic structure of atoms, simple periodic properties of the elements.	3
5	Stoichiometry, atomic and molecular weights.	3
6	The mole, simple quantitative calculations with chemical reactions.	3
7	Basics of chemical equilibrium.	3
8	Acids and bases.	3
9	Thermochemistry.	3
10	Chemistry of life: Organic and biological chemistry	3
Total		**30**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	**Familiar with the International system of units**	• **Lectures** • **Library visits**	**Quiz.** **Exam.**

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Web-based study	Class discussion.
1.2	Write the electronic configuration of different elements	• Lectures • Scientific discussion Web-based study	Quiz. Exam. Class discussion.
1.3	Familiar with the atomic structure	• Lectures • Scientific discussion Web-based study	Quiz. Exam. Class discussion.
1.4	Describe the mass relationships in chemical reactions	• Lectures • Library visits • Web-based study	Quiz. Exam. Class discussion.
1.5	List the factors affecting equilibrium position and equilibrium concentration.	• Lectures • Scientific discussion • Web-based study	Quiz. Exam. Class discussion.
1.6	List the various types of chemical reaction	• Lectures • Scientific discussion • Web-based study	Quiz. Exam. Class discussion.
1.7	Recognize and know which elements in the Periodic Table	• Lectures • Scientific discussion • Web-based study	Quiz. Exam. Class discussion.
1.8	familiar with the terms hydrocarbons, organic compounds containing oxygen and nitrogen atoms	• Lectures • Scientific discussion • Web-based study	Quiz. Exam. Class discussion.
2.0	Skills		
2.1	Predict molecular formulas using empirical formulas and molecular masses.	• Lectures • Scientific discussion Web-based study	Quiz. Exam. Class discussion.
2.2	Explain trends in the Periodic Table as they relate to Atomic Size, Ionization Energy and Electron Affinity.	• Lectures • Scientific discussion Web-based study	Quiz. Exam. Class discussion.
2.3	Calculate the concentration of a solution from the volume and the mass, or moles, of solute	• Lectures • Scientific discussion Web-based study	Quiz. Exam. Class discussion.
2.4	Calculate the pH of acids and bases	• Lectures • Scientific discussion Web-based study	Quiz. Exam. Class discussion.
3.0	Values		
3.1	Demonstrate commitment to professional and academic values, and ethics in the field of chemistry	• Lectures • Scientific discussion	Class discussion. Assignment activities
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Class activities, Attendances and Duties	Throughout the Term	10%
2	Mid-Term Exam (s)	Week 6-8	20%
3	Lab Activity and Final Exam on Lab	Throughout the Term	30%
4	Final Exam.(2 hours exam)	End of the Term	40%
5	Total	100%	

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- **We have faculty members to provide counselling and academic advice.**
- **2 hours per week as office hours are available for discussion with the students.**

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	**General Chemistry, by Chang, 9th ed., 2007, MacGraw-Hill.**
Essential References Materials	**Steven S. Zumdahl, Susan A. Zumdahl, 9th ed., 2009, New York.**
Electronic Materials	**Power point lectures.**
Other Learning Materials	**Course available online**

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	**Classrooms.** **Providing hall of teaching aids including computers and projector.**
Technology Resources (AV, data show, Smart Board, software, etc.)	**Room equipped with computer and projector and TV**

Item	Resources
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	------

G. Course Quality Evaluation

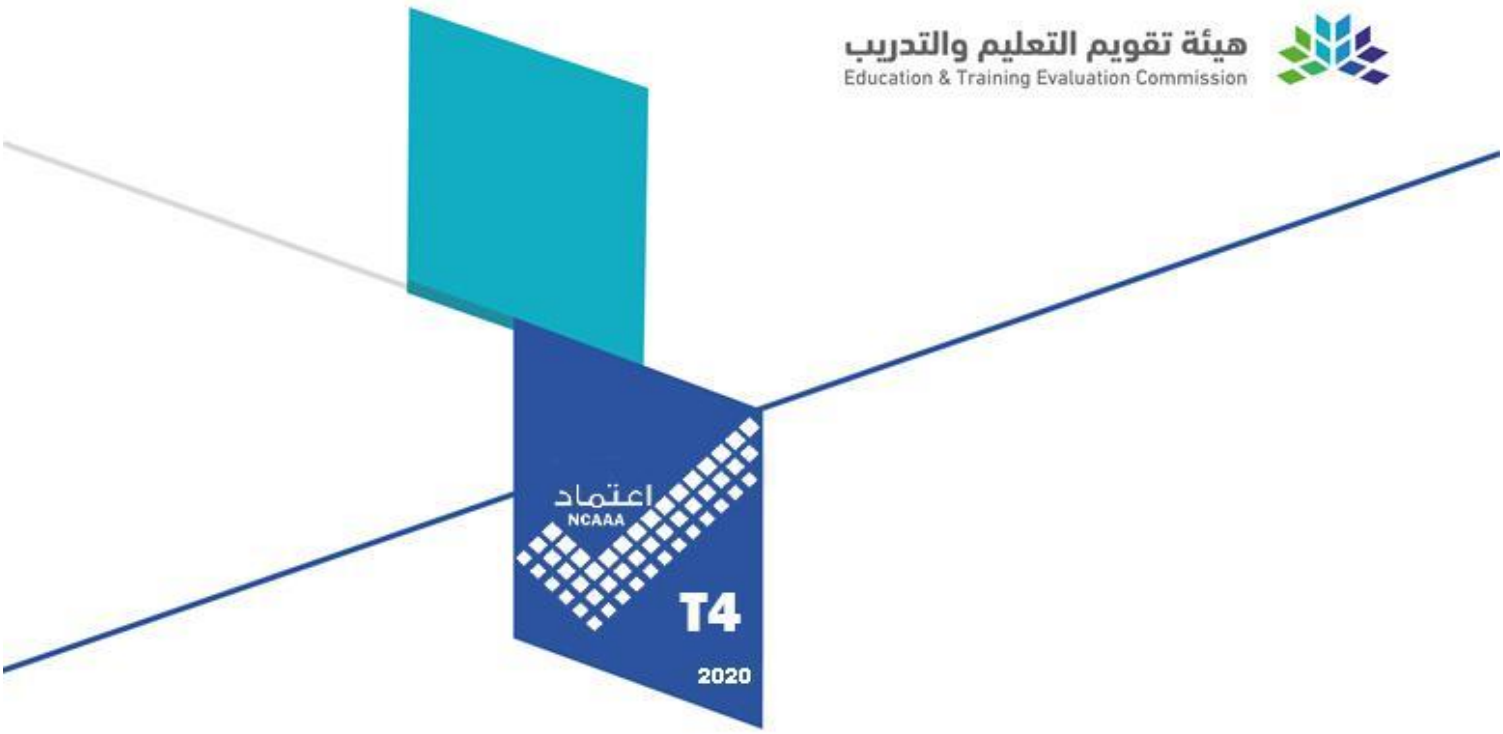
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	**Students**	**Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) .**
Effectiveness of teaching	**Faculty members**	**Direct (classroom observation using the Teaching Observation**
Achievement of course learning outcomes.	**Faculty members**	**Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).**
Assessment of faculty members	**Department head**	**Direct (Performance Assessment of faculty** **Indirect (feedback from faculty and students).**
Quality of learning resources	**Students**	**Direct (feedback from faculty).** **Indirect (online survey at the end of the semester.**
Effectiveness of teaching Strategies for Learning Outcomes.	**Faculty members**	**Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).**

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	**15.03.2022**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**General Physics 1**
Course Code:	
Program:	**Physics**
Department:	**Physics**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 4 (3+1)
2. Course type **a.** University ☐ College ☑ Department ☐ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level 1st/ 1st year
4. Pre-requisites for this course (if any)**:**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	60	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others**	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

The course will cover the principles of general physics, such as measurements, vectors, Motion in one dimension, Newton's laws, work and energy. The course will also provide a conceptual background of experimental physics sufficient to enable students to take courses that are more advanced in related fields.

2. Course Main Objective

After completing this course student should be able to:

1. Define the concepts of the measurements, length, time, and weight.
2. Differentiate between the vectors and the scalars
3. Calculate the vectors sum, and vectors product.
4. Define the concepts of force and gravity.

5. Apply Newton's laws of motion to calculate the position, velocity and acceleration.
6. Differentiate between Work, Energy, and power.

In addition to these items, the students should gain practical skills through performing some experimental class.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Define the physical quantities related to the measurement, motion in one dimension, vectors, Newton's law of motion, work and energy .	K1
1.2	Describe the concepts and physical laws related to the measurement, motion in one dimension, vectors, Newton's law of motion, work and energy using the mathematical formula.	K2
1.3		
2	**Skills:**	
2.1	Apply physics laws to calculate physical quantities related to the measurement, motion in one dimension, vectors, Newton's law of motion, work and energy.	S1
2.2	Explain the procedures for scientific theoretical treatments as well as empirical observations.	S2
2.3		
3	**Values:**	
3.1	Work effectively responsibly in teamwork	V2
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	**Measurement** ● Measuring Things ● The International System of Units ● Changing Units ● Length ● Significant Figures and Decimal Places ● Time ● Mass	**5**
2	**Motion Along a Straight Line** ● Position, Displacement, and Average Velocity ● Motion ● Position and Displacement ● Average Velocity and Average Speed ● Instantaneous Velocity and Speed ● Acceleration ● Constant Acceleration: A Special Case ● Another Look at Constant Acceleration ● Free-Fall Acceleration ● Graphical Integration in Motion Analysis	**5**
3	**Vectors** ● Vectors and Their Components ● Vectors and Scalars ● Adding Vectors Geometrically ● Components of Vectors	**5**

	● Unit Vectors Adding Vectors by Components ● Vectors and the Laws of Physics ● Multiplying Vectors	
4	**Motion in Two and Three Dimensions** ● Position and Displacement ● Position and Displacement ● Average Velocity and Instantaneous Velocity ● Average Acceleration and Instantaneous Acceleration ● Projectile Motion ● Uniform Circular Motion ● Relative Motion in One Dimension ● Relative Motion in Two Dimensions	**5**
5	**Force and Motion-I** ● Newtonian Mechanics ● Newton's First Law ● Force ● Mass ● Newton's Second Law ● Some Particular Forces ● Newton's Third Law ● Applying Newton's Laws	**5**
6	**Force and Motion-II** ● Friction ● Properties of Friction ● The Drag Force and Terminal Speed ● Uniform Circular Motion Forces	**5**
	Practical Part: ● Safety Procedures in the Lab. ● Introduction to Graphing and Data Analysis ● The Errors in Experimental Physics ● Fine Measurements ● The Lever ● Force Table-I ● Force Table-II ● Position, Velocity, and Acceleration ● Newton's Second Law ● Free Fall	**10**
Total		40

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Define the physical quantities related to the course.	1. Demonstrating the basic principles through lectures.	1. Solve some examples during the lecture. 2. Discussions during the lectures 3. Exams:
1.2	Describe the concepts and physical laws related to the course using the mathematical formula.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3		2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: ● Board, Power point. ● Discussions ● Brain storming ● Start each chapter by general idea and the benefit of it. 4. Do some experimental in the Laboratory	a) Quizzes. b) Midterm exams. c) Final exam. d) Practical exams.
2.0	**Skills**		
2.1	Apply physics laws to calculate physical quantities related to the course.	1. Solve some problems in physics during lectures. 2. Following some proofs during lectures. 3. Encourage students to participate in solving problems.	1. Solve some examples during the lecture. 2. Discussions during the lectures 3. Exams: a) Quizzes. b) Midterm exams. c) Final exam. d) Practical exams.
2.2	Explain the procedures for scientific theoretical treatments as well as empirical observations.		
2.3			
3.0	**Values**		
3.1	Work effectively responsibly in teamwork	● Give students tasks of duties. ● Organize the students as a small group in the lab.	● Evaluate the scientific reports. ● Discussing the reports with each teamwork. ● Evaluate the efforts of each student in preparing the report.
3.2			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	7th	20 %
2	HomeWorks & Quizzes	All weeks	10 %
3	Practical Exam	End of the semester	20 %
4	Final Exam	End of the semester	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Each student will be supervised by academic adviser in Physics Department and the time table for academic advice were given to the student each semester. (4 hrs per week)

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018)

Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	● Classroom ● Laboratory ● Library
Technology Resources (AV, data show, Smart Board, software, etc.)	● Data show ● Black Bord
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching Strategies	Students	Questionnaire
Effectiveness of student assessment	Instructor	Exams
Extent of achievement of course learning outcomes	Instructor	Course report
Quality of learning resources	Instructor	Course report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	Genetic and environmental interaction (Ecological Genetics)
Course Code:	
Program:	Environmental Sciences
Department:	Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:	**3 hrs**
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	**Level 7 / third year**
4. Pre-requisites for this course (if any)**:**	**Biochemistry**
5. Co-requisites for this course (if any)**:**	**NA**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	3 hrs/week/12weeks	100%
2	**Blended**	-	-
3	**E-learning**	-	-
4	**Distance learning**	-	-
5	**Other**	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	24 hrs
2	**Laboratory/Studio**	36 hrs
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	60 hrs

B. Course Objectives and Learning Outcomes

1. Course Description

Genetic and environmental interaction course describes ecological influences on genetic properties within and between populations. Ecological genetics is composed of characteristics from the fields of spatial ecology, population genetics, and evolution. The term has been used to describe research examining both environmental/ecological effects on population genetics within populations (e.g., adaptation, selection) and environmental/ecological effects on gene flow and genetic isolation between populations (e.g., metapopulations, population structure). In addition, conservation genetics, which examines the population genetics of rare and endangered species, has many parallels with ecological genetics and will briefly be covered in the course.

2. Course Main Objective

- This course will introduce students to traditional mendelian genetics, a review of ecological processes of microevolution, and an overview of relevant concepts in population genetics. In the main time the course will examine environmental influences on genetic properties within populations, conservation genetics, and landscape genetics (environmental influences on gene flow between populations).

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Students will understand the sources, implications of, and influences on genetic variability in natural populations	
1.2	Students will be able to conceptualize microevolutionary processes through a population genetics framework	
1.3	Students will understand the four microevolutionary forces that influence genetic change in populations, their effects, and their interactions	
2	**Skills :**	
2.1	Students will know research applications of ecological genetics and know common genetic measurements of populations and measurements of gene flow between populations	
2.2	Students will understand how environmental properties interact with the genetic characteristics of populations	
2.3	Students will know the role ecological genetics plays in understanding genetic properties of rare and endangered species	
2.4	Students will understand how ecological factors promote or restrict gene flow between populations in plants, terrestrial animals, and aquatic organisms	
3	**Values:**	
3.1	A proficiency in the appropriate use of contemporary technologies.	
3.2	A commitment to continuous learning and the capacity to maintain intellectual curiosity throughout life.	
3.3	A commitment to the highest standards of professional effort and the ability to take a leadership role in the community.	
3.4	An awareness of ethical, social and cultural issues within a global context and their importance in the exercise of professional skills and responsibilities.	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction, background, and population genetics	2
2	Microevolution Overview, Adaptive Microevolution, Neutral Microevolution, Genetic Variation	2
3	Genetic Markers & Alleles, Random Mating, Hardy Weinberg Equilibrium, Non-Random Mating, Sexual Selection & Inbreeding	2
4	Four Forces of Microevolution (allele change in populations over generations), Mutation, Gene flow, Populations, & Metapopulations, Genetic Drift	2
5	Natural Selection & Adaptation, Overdominance (Heterozygote Advantage)	2
6	Phenotypic Plasticity & Genotype-Environment Interactions, Correlations Among Traits, Linkage Disequilibrium, Genetic Correlations in Nature	2
7	Artificial Selection & Selective Breeding, Quantitative Trait Locus (QTL) Mapping, Isolation by Environment	2
8	Distinct Evolutionary Lineages & Endangered Species, Genetic Bottlenecks & Founder Effects, Minimum Effective Population Sizes & Conservation of Genetic Diversity	2
9	Overview of Landscape Ecology, Intrinsic & Extrinsic Influences on Gene Flow, Landscape Effects on Genetic Variation, Isolation by Resistance & Barriers to Gene Flow	
10	Direct & Indirect Measures of Gene Flow, Coalescent Theory, Clustering and Assignment Methods	2
11	Landscape Genetics in Plant Populations, Landscape Genetics in Terrestrial Animals	2
12	Waterscape Genetics	2
Total		24

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Students will understand the sources, implications of, and influences on genetic variability in natural populations	1. In-class lecturing where the previous knowledge is linked	1- homework and quizzes. 2- Midterm and final written

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Students will be able to conceptualize microevolutionary processes through a population genetics framework	to the current and future topics. 2. Homework assignments. 3. Discussions (connecting what they learn in the class and applying this information in laboratory). 4. Handout of lecture notes for each topic.	exams (theoretical and practical). 3- Evaluation of reports. 4- Oral presentation. 5-Course work reports.
1.3	Students will understand the four microevolutionary forces that influence genetic change in populations, their effects, and their interactions		
2.0	**Skills**		
2.1	Students will know research applications of ecological genetics and know common genetic measurements of populations and measurements of gene flow between populations	1- Application of essential scientific techniques through lectures, classes and essays. 2- Small group discussion. 3- Ask the students to make small search project during the semester. 4- Making connections between different topics across the course. 5- Class discussions (Engage students in interaction with questions and answers). 6- Homework assignments. 7- Use of microscopic illustrations. 8- Laboratory training.	1-Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 2-Midterm and final exams. 3-Checking the homework assignments. 4-Course work reports.
2.2	Students will understand how environmental properties interact with the genetic characteristics of populations		
2.3	Students will know the role ecological genetics plays in understanding genetic properties of rare and endangered species		
2.4	Students will understand how ecological factors promote or restrict gene flow between populations in plants, terrestrial animals, and aquatic organisms		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		9- Activities and homework.	
3.0	**Values**		
3.1	A proficiency in the appropriate use of contemporary technologies.	1- Engage student in carrying out internet search. 2- The ability to debate the scientific basis of physiological mechanisms of body systems. 3- Writing group reports. 4- Solving problems in groups during tutorial. 5- Checking the homework assignments in groups during discussion. 6- Cooperative learning and application of scientific method in thinking the scientific problem solving. 7- Work as part of a team. 8- Conducting group experiments and writing group reports. Dividing students into groups to cooperate with each other during the experiments.	1- Oral exams. 2- Evaluation of student essays assignments and search work. 3- Observation of student ethical and moral behavior. 4- Students' attendance is recorded during lectures. 5- Assessment of the student reports. 6-Grading homework assignments.
3.2	A commitment to continuous learning and the capacity to maintain intellectual curiosity throughout life.		
3.3	A commitment to the highest standards of professional effort and the ability to take a leadership role in the community.		
3.4	An awareness of ethical, social and cultural issues within a global context and their importance in the exercise of professional skills and responsibilities.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodical Exam(s)	3	10%
2	Mid Term Exam (Theoretic)	6	20%
3	Mid Term Exam (practical)	5	10%
4	Reports and essay	7	5%
5	Final Practical Exam	11	15%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
6	Final Exam	12	40%
7	Total		100%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

4 office hours per week

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Landscape Genetics: Concepts, Methods, Applications. 2016. Balkenhol, Niko, Cushman, Samuel A., Storfer, Andrew T., & Waits, Lisette P. (eds). ISBN: 978-1118525296 A Primer of Ecological Genetics. 2004. Conner, Jeffrey K. & Hartl, Daniel L. ISBN: 978- 0878932023
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	Computers or internet connection. Active Board. Data show is required in every room.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Laboratory instruments & equipment: Spectrophotometer, centrifuge, pH meters, flasks, beakers, screw capped tubes, slides and tips and chemicals kits.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching	Students	Questionnaires
2. Quality of learning resources	Staff and Students	Questionnaires

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

H. Specification Approval Data

Council / Committee	
Reference No.	
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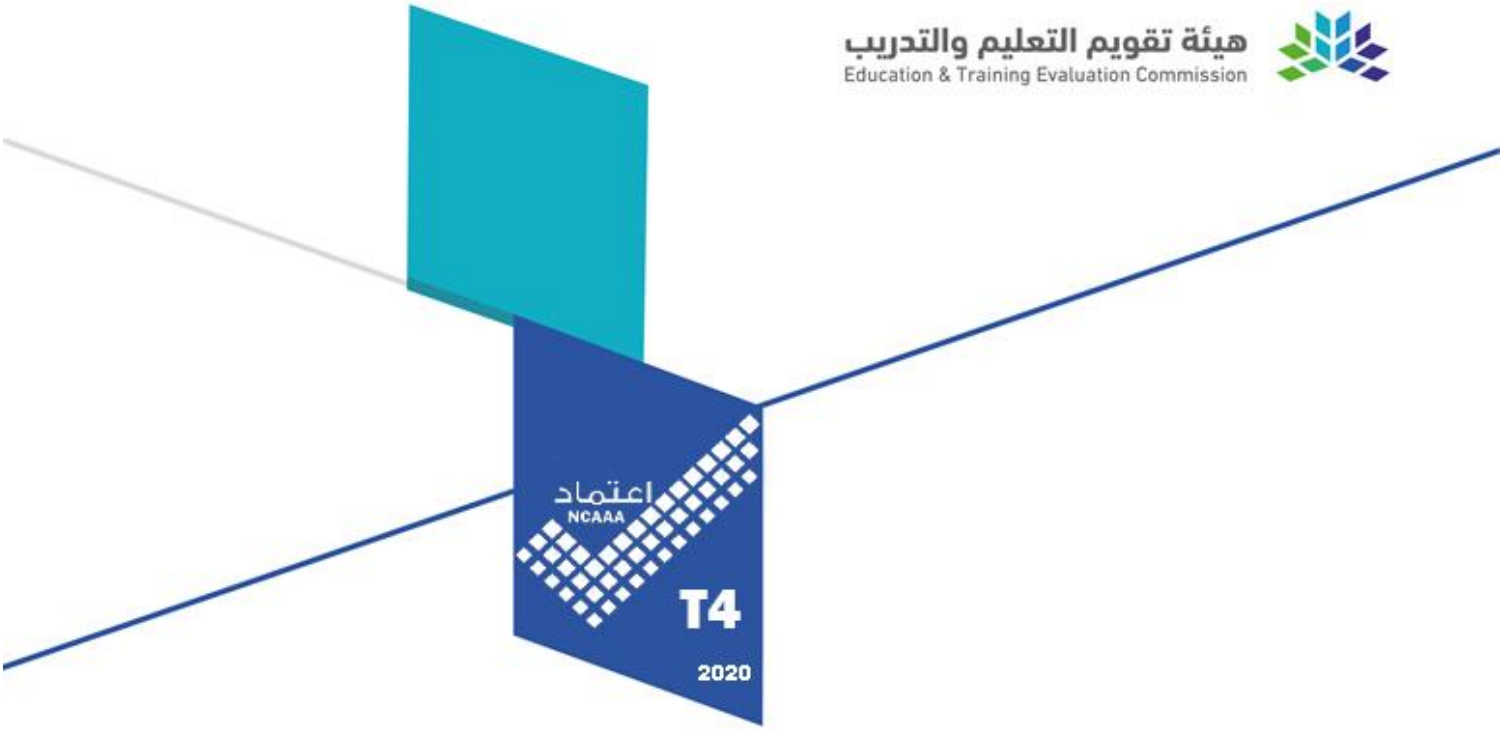
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Research Project**
Course Code:	
Program:	**Environmental Science**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al- Qura University**

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level 12, Fourth year
4. Pre-requisites for this course (if any)**: Permission of the Department**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		30
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		70

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

At the end of this course student should be able to evaluate the different approaches used and suggest future experiments or alternative strategies for addressing the problem. The student should be able to conversant with writing a scientific report and presenting scientific data in a clear accessible manner. The skills learnt will be applicable to problem solving exercises encountered in all types of employment

2. Course Main Objective

- **After completing this course student should be able to:**
- Gain practical and/or theoretical knowledge about particular area of environmental science.

- Work independently on the research project under the supervision of academic member of staff, and should be able to design experiments to answer the particular question posed, and critically analyzed the results. There will be scope for initiative in this element of the project.
- Be able to set the work in the context of work done by other experimentalists, and provide a concise summary of relevant literatures.
- Summarize and provide a concise summary of relevant literatures.
- Displaying and organizing different types of data.
- Preparing and representing the data.
- Thinking about all new topics in the different fields of environmental science.
- Ability to design the laboratory experiment
- Carryout most the techniques in the field of environmental science.
- Understand and discuss the new research topics in field of environmental science.
- Ability to demonstrate oral presentation in the field of environmental science.
- Understand all new issues in environmental science.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Gain practical and theoretical knowledge about a particular area of environmental science.	K1
1.2	Work independently on the research project under the supervision of an academic member of staff, and should be able to design experiments to answer the particular question posed, and critically analyse the results. There will be scope for an initiative in this element of the project.	K1
1.3	Be able to set the work in the context of work done by other experimentalists and provide a concise summary of relevant literature.	K3
2	**Skills :**	
2.1	Summarize and provide a concise summary of relevant literature.	S1
2.2	Displaying and organizing different types of data.	S2
2.3	Preparing and representing the data.	S2
2.4	Thinking about all new topics in the different fields of environmental science.	S2
2.5	Ability to design the laboratory experiment.	S2
2.6	Carryout most of the techniques in the field of environmental science.	S6
3	**Values:**	
3.1	Developing oral presentations.	V2
3.2	Communicating personal ideas and thoughts.	V2
3.3	Work independently and as part of a team to finish some assignments	V4

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to research project	**2**
2	Where and how I start ?: Thinking of research ideas, Purpose of research, Research questions or hypothesis, Are these questions/hypothesis feasible to achieve?, Problems with research questions/hypothesis, research title.	**2**
3	Project preparing: Project management, project timeline, project ethics	**2**

4	The literature review: Primary and secondary sources, quality of sources, Your literature review should tell a story, how to make it a story?, Speed reading and taking notes, Critical awareness while reading, How to search for information, Managing references, Various style of referencing systems.	**2**
5	Research methodology I: Research design, Research approach, building your way from research purpose, to question, to approach, to data gathering.	**2**
.6	Methodology II: Types of research methods: experimental, Case studies, Cross-sectional studies, Longitudinal studies, surveys, Comparative studies, How to structure and write up your methodology?	**2**
7	Results analysis: Types of results, comparative analysis, statistical analysis, results presentation (tables, graphs, figures)	**2**
8	Concluding and writing up: Writing a discussion, writing a conclusion, writing an abstract and finalizing the title, general points about writing a research/review article and presentation coda	**2**
9	Set up a small project at (laboratory or field) parallel with theoretical lectures, for each student or a group of three students to begin to implement theoretical ideas on the ground (small training research point), collecting their own actual data, analyzing, representing the collected data, commenting, and critical discussing it and writing an assay about it. This assay will be revised by supervisor and critically discussed with the student/students group by examiners board (usually two departmental scientific staff members).	**4**
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Gain practical and theoretical knowledge about particular area of environmental science.	• The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. • At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course. • All students will be involved in on-line learning process and each student is required to create an E-mail address to	• Submission of a literature review. Submission of research report.
1.2	Work independently on the research project under the supervision of academic member of staff, and should be able to design experiments to answer the particular question posed, and critically analysed the results. There will be scope for initiative in this element of the project.		
1.3	Be able to set the work in the context of work done by other experimentalists, and provide a concise summary of relevant literatures.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		facilitate student web interactions. •Using images and movies. •Encouraging students to collect the new information about what the new in environmental science. Enable the reference books and scientific sites concerning biology in internet.	
2.0	**Skills**		
2.1	Summarize and provide a concise summary of relevant literatures.	• Lectures. • Brain storming. • Discussion	• Submission of a literature review. Submission of research report.
2.2	Displaying and organizing different types of data.		
2.3	Preparing and representing the data.		
2.4	Thinking about all new topics in the different fields of environmental science.		
2.5	Ability to design the laboratory experiment.		
2.6	Carryout most the techniques in the field of environmental science.		
3.0	**Values**		
3.1	Developing oral presentations.		• Assignments (Individual and group) • Presentation (Individual and group) assessments.
3.2	Communicating personal ideas and thoughts.		
3.3	Work independently and as part of a team to finish some assignments		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Writing a literature review	4	30%
2	Participation / discussion / set up of small research project	All weeks	25%
3	Writing a brief proposal for a graduation project	7	45%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.
- Laboratory assistance.
  - E-mail communications.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Writing Scientific Research Articles: Strategy and Steps. 2nd Edition. by Margaret Cargill , Patrick O'Connor, ISBN-13: 978-1118570708. 2013. Wiley-Black Well Press., Enjoy Writing Your Science Thesis or Dissertation: A Step by Step Guide to Planning and Writing a Thesis or Dissertation for Undergraduate and Graduate Science Students. 2nd Edition by Elizabeth M Fisher, Richard C Thompson. ISBN-13: 978-1783264216. 2014. Imperial College Press.
Essential References Materials	
Electronic Materials	*www.columbia.edu/cu/biology/ug/research/paper.html* *https://www.youtube.com/watch?v=0oAFVHb21HM* *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474301/*
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Class room is already provided with data show The area of class room is suitable concerning the number of enrolled students and air conditioned
Technology Resources (AV, data show, Smart Board, software, etc.)	• Digital lab containing computers.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• All equipments and devices: centrifuges, measuring equipment, water bath, digital balances, pH meters, safety facilities. • All chemical that needed • Greenhouse chamber

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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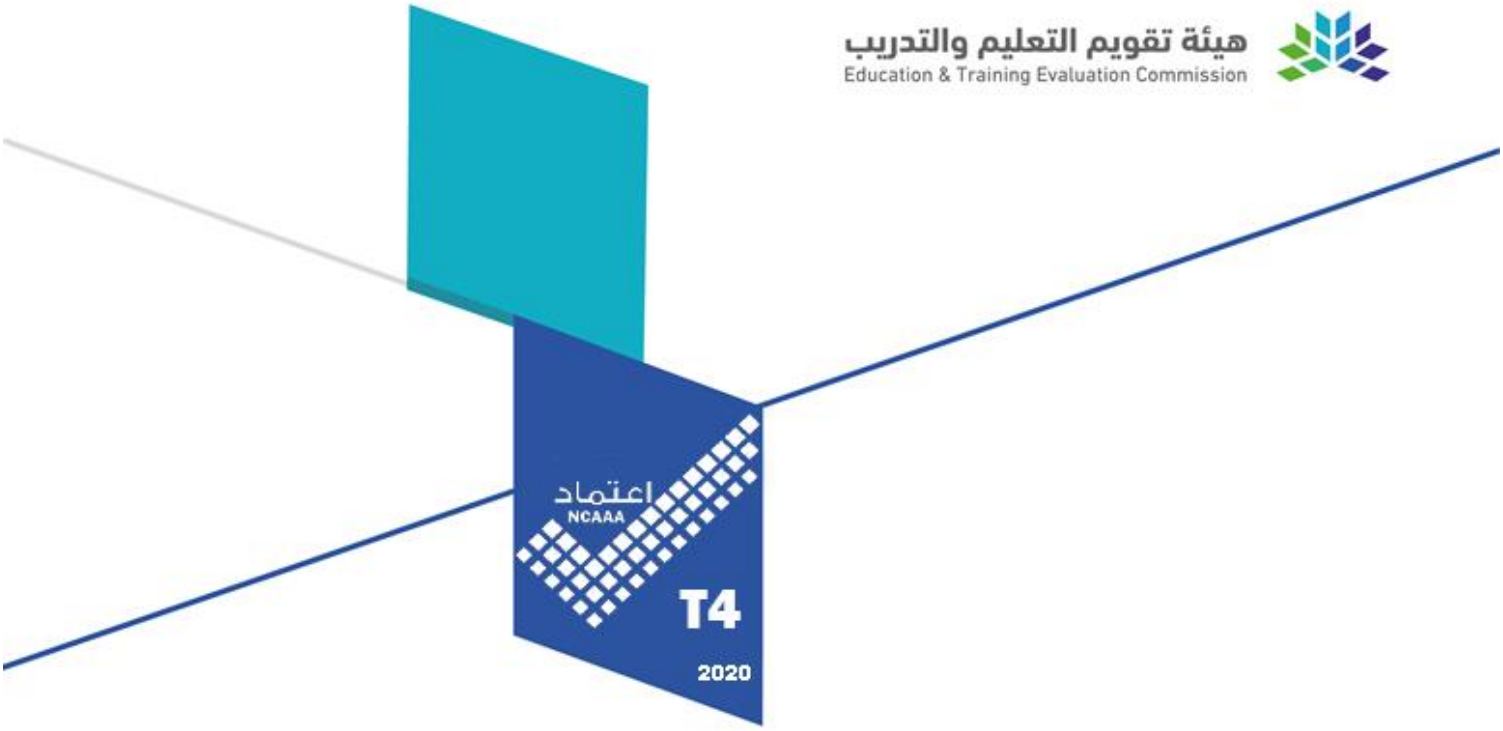
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Inorganic chemistry**
Course Code:	**-----**
Program:	**Environmental Science**
Department:	**Chemistry**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours:	**3 hr (2 theoritical + 1 practical)**
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	5th level / 2nd year
4. Pre-requisites for this course (if any)**:**	General Chemistry
5. Co-requisites for this course (if any)**: ---**	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100 %
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**	---	---

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**20**
2	**Laboratory/Studio**	**27**
3	**Tutorial**	**---**
4	**Others** (quizzes and exams)	**6**
	Total	**53**

B. Course Objectives and Learning Outcomes

1. Course Description

This course offers the basic background for inorganic chemistry at all. The periodic table content and their classification as well as their general properties are the basic concepts which taken firstly. The theories discussed the inorganic compounds were being interested. The Lewis structures of the compounds, the principal quantum numbers. The practical part learning the how to differentiate between different radicals as cationic or anionic.

2. Course Main Objective

At the end of this course, the students must be able to discuss and explain the following concepts;

a. The atomic history, atomic shells, their shapes
b. Thehistory of periodic table construction and the classification of elements
c. The common poperties of each class of elements in the table
d. The electronic configurations, Lewis structures of different chemical compounds.
e. The Theories discussed the covalence compounds
f. The principal of quantum numbers and the ionic crystals
g. Learning the studients how to differentiate between acid and base radicals.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Knowing the history of atoms and the periodic table construction, also describe the atomic construction, atomic shells and their shapes.	K1
1.2	Indentifying the classification of elements in the periodic table and their general properties	K2
1.3	Learning the basis of valence shell electron pairs repulsion theory, valence bond theory and molecular orbital theory	K2
1.4	The ionic crystals and their basis of stability	K2
2	**Skills:**	
2.1	Illustrate how to identify the four quantum numbers for different electrons	S2
2.2	Apply the rules of different theories to predict the geometical shapes of covalent compounds.	S1
2.3	Compare between different compounds according to the the types of chemical bonds connecting their atoms or ions.	S1
2.4	Apply IT and communication technology in gathering and interpreting information concerning the course topics.	S3
2.5.	Experiments about the differentiation between the cationic and anionic radicals, practically	S3
3	**Values:**	
3.1	Work indvedually to use the online libraries for searching and interpreting the course topics.	V1
3.2	Write and present, collaboratively and constructively, reports related to course topics.	V2
3.3	Work indvedually in the lab to make different experiments to identify acid-base radicals	V2

C. Course Content

No	List of Topics	Contact Hours

1	Historical background: The atomic and description of shells with different shapes; The periodic table and the general classification	**2**
2	The electronic distribution principles and the four quantum numbers.	**2**
3	The commen properties of the elements in periodic table	**4**
4	Chemical bonds; their types and theories – Lewis symbols and structures. And	**2**
5	Valence shell electron pairs repulsion theory.	**2**
6	Valence bond theory.	**2**
7	Hybridization and its types and Bohr's theory	**2**
8	Molecular orbital theory – octet rule.	**2**
9	Properties of ionic crystals and covalent compounds.	**2**
	Practical part	
10	Qualitative inorganic analysis: Identification of acidic and basic radicals - Identification of simple inorganic liquids.	**27**
Total		**50**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Knowing the history of atom description and the periodic table classess	Lecture scientific discussion	Quiz periodic exams. final exam.
1.2	Classify the elements in the periodic table and discuss their periodic properties.	Lecture scientific discussion	Quiz periodic exams. final exam.
1.3	Identifying the theories of inorganic compounds and how to differentiate between them	Lecture scientific discussion	Quiz periodic exams. final exam.
1.4	Learning how to to identify acid-base radicals	Laboratory traning	Periodic assessements and final practical exam
2.0	**Skills**		
2.1	Learning how to estimate the four quantum numbers for different electrons in an atom	Lecture scientific discussion	Quiz periodic exams. final exam.
2.2	Apply the rules of different theories to predict the geometical shapes of covalent compounds.	Lecture scientific discussion	Quiz periodic exams. final exam.
2.3	Compare between different compounds according to the the types of chemical bonds connecting their atoms or ions.	Lecture scientific discussion	Quiz periodic exams. final exam.
2.4	Apply IT and communication technology in gathering and	Web-based study	Activites.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	interpreting information concerning the course topics		
2.5.	Experimental work to differentiate between acid-base radicals to known unknown inorganic compounds	Individual training in the lab	Periodically and final exam
3.0	**Values**		
3.1	Work indvedually to use the on-line libraries for searching and interpreting the course topics.	Web-based study	Activites
3.2	Write and present, collaboratively and constructively, reports related to course topics.	Library visits Web-based study	Assignments
3.3	Work indvedually in the lab to identify unknown inorganic compounds	Laboratory work	Periodically

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	**--**	**10 %**
2	Periodic Exam.	**5**	**20 %**
3	Practical exam.	**11**	**30 %**
4	Final Exam (2 hours exam)	**12**	**40 %**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Office hours: During the working hours weekly,
- Academic advising for students.
- Availability of Staff members to provide counseling and advice.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- General Chemistry: The Essential Concepts 7th Edition by Raymond Chang Dr., Kenneth Goldsby Professor, 2013.
Essential References Materials	- Catherine Housecroft and Alan G. Sharpe Inorganic Chemistry, 4th ed. Pearson, 2012.

	- J. D. Lee, Concise Inorganic Chemistry, 5th ed., Wiley-Blackwell, 1998. - H. B. Gray. Chemical Bonds: An Introduction to Atomic and Molecular Structure, University Science Books, 1994.
Electronic Materials	• http://www.chemweb.com • http://www.sciencedirect.com • http://www.rsc.org
Other Learning Materials	• The course which prepared from inorganic chemistry stuff members

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Well-equipped lecture halls.
Technology Resources (AV, data show, Smart Board, software, etc.)	Room equipped with computer, data show and TV.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	The laboratory is relatively qualified for the practical part

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Quality of learning resources	Students	Complete the questionnaire evaluation of the course periodically.
Effectiveness of teaching and assessment.	Program Leaders	Periodic review of final exams and the student's degrees in this course.
Extent of achievement of course learning outcomes.	Peer Reviewer	Checking selected exam papers, and student assignments.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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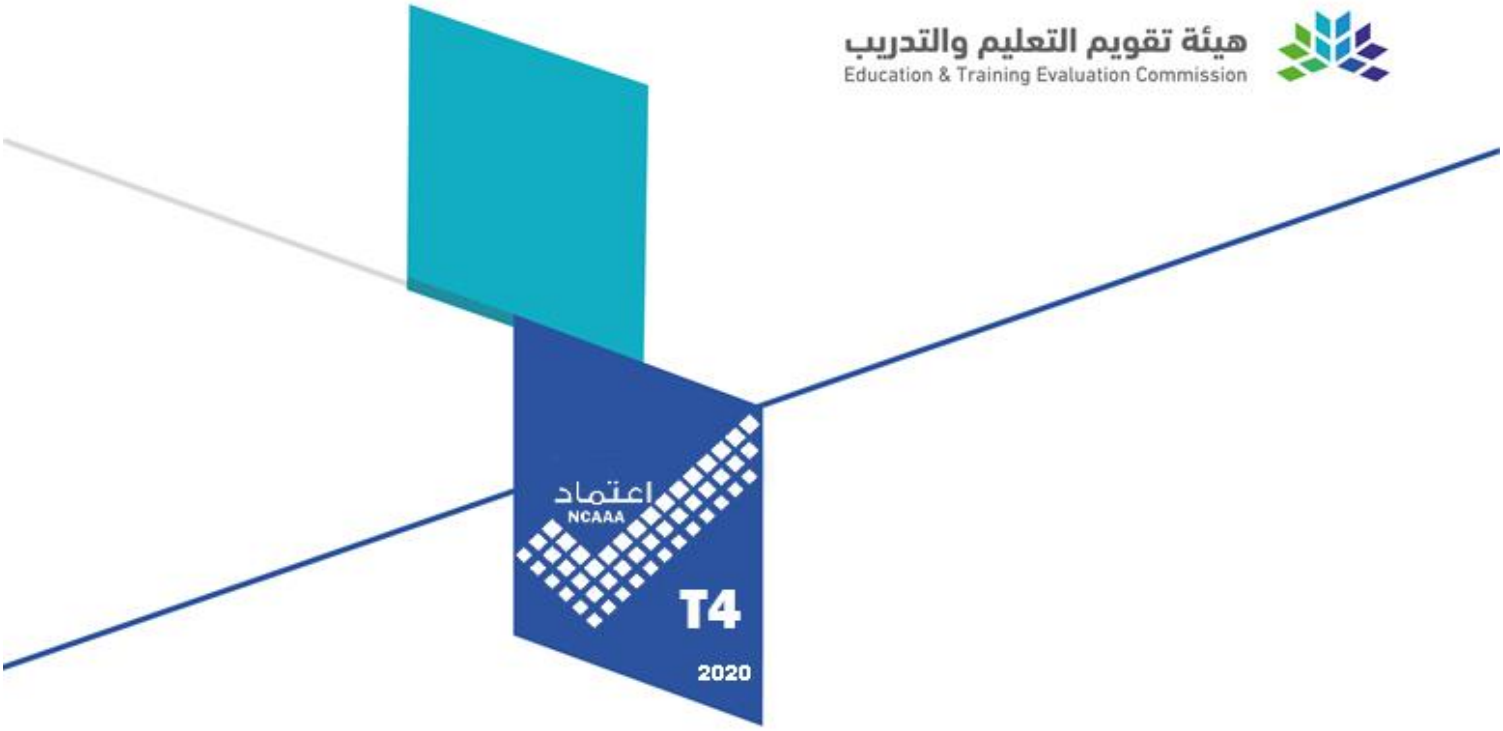
Education & Training Evaluation Commission



Course Specifications

Course Title:	Instrumental chemical analysis
Course Code:	
Program:	Environmental science
Department:	Chemistry
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours: 3 (2 theoretical + 1 practical)
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: 6th level/2nd year
4. Pre-requisites for this course (if any)**: Quantitative Analysis**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	27
3	**Tutorial**	
4	**Others** (specify)	6
	Total	53

B. Course Objectives and Learning Outcomes

1. Course Description

This course will be concerned with the theory and practice of instrumental methods for the identification and quantitative analysis of chemical substances.

2. Course Main Objective

By the end of this course student have all information about the instrumental analysis and have ability to determine compounds, molecules and trace amounts of different compounds and metals.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Describe the principles and applications of spectrophotometric, electroanalytical and chromatographic analysis techniques.	K1

CLOs		Aligned PLOs
1.2	Recognize the spectrophotometric, electroanalytical and chromatographic measurements theory, the potentiometric methods and potentiometric titrations	K2
1.3	Outline voltammetry, chromatography, x-ray, Raman, and FT-IR techniques.	K1
2	**Skills :**	
2.1	Apply broad theories, principles, and concepts in various contexts, in spectrophotometric, electrochemical and chromatographic techniques	S1
2.2	Solve complex problems in various contexts related to spectrophotometric, electrochemical and chromatographic techniques and overlapped disciplines quantitatively and qualitatively.	S2
2.3	Use and adapt spectrophotometric, electrochemical, chromatographic and spectroscopic processes, techniques, tools, instruments, and/or materials that are advanced to deal with various complex practical activities	S3
3	**Values:**	
3.1	Write and present a chemical report and solve problems related to spectrophotometric, electrochemical, chromatographic and spectroscopic analysis	V4
3.2	Work collaboratively and constructively in teams with responsibility to perform a specific experiment or preparing a report on the spectrophotometric, electrochemical, chromatographic and spectroscopic processes.	V3

C. Course Content

No	List of Topics	Contact Hours
1	General properties of electromagnetic radiation and its interaction with matter, the electromagnetic spectrum as well as the absorption and emission of electromagnetic radiation	2
2	Ultraviolet and visible molecular absorption spectroscopy, Beer's law, true and apparent deviations from Beer's law, application of Beer's law, calibration curve.	2
3	Qualitative and quantitative analysis by UV-Vis. Applications of spectrophotometric methods in chemical equilibrium studies, spectrophotometric titrations	2
4	Flame emission and atomic absorption spectroscopy, nebulisation, burners and nebulizers, flames and flame temperature, interferences, flame spectrometric techniques, flame emission spectrometry, flame photometer, flame atomic absorption spectrometry and applications	2
5	ICP and its use for the analysis of environmental samples	2
6	Introduction to electroanalytical methods; types and components.	2
7	Applications of electroanalytical methods for analysis of analysis of environmental samples.	2
8	Introduction to chromatographic methods; types and components.	2
9	Applications of chromatographic methods for environmental samples.	2
10	Applications of x-ray spectrometry, FT-IR and Raman spectrometry for the analysis of environmental samples.	2
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Describe the principles and applications of spectrophotometric, electroanalytical and chromatographic analysis techniques.	Lectures and Scientific discussion	Quiz
1.2	Recognize the spectrophotometric, electroanalytical and chromatographic measurements theory, the potentiometric methods and potentiometric titrations	Lectures and Scientific discussion	Quiz and Exam
1.3	Outline voltammetry, chromatography, x-ray, Raman and FT-IR techniques.	Lectures and Scientific discussion	Quiz and Exam
2.0	**Skills**		
2.1	Apply broad theories, principles, and concepts in various contexts, in spectrophotometric, electrochemical and chromatographic techniques	• Lectures	Quiz and Exam
2.2	Solve complex problems in various contexts related to spectrophotometric, electrochemical and chromatographic techniques and overlapped disciplines quantitatively and qualitatively.	• Lectures • Lab work	Final Exam Lab exam
2.3	Use and adapt spectrophotometric, electrochemical, chromatographic and spectroscopic processes, techniques, tools, instruments, and/or materials that are advanced to deal with various complex practical activities	• Lectures • Lab work	Final Exam Lab exam
3.0	**Values**		
3.1	Write and present a chemical report and solve problems related to spectrophotometric, electrochemical, and chromatographic and spectroscopic analysis.	• Lab Work. • Class discussion and research activity.	• Quiz. • Lab report
3.2	Work collaboratively and constructively in teams with responsibility to perform a specific experiment or preparing a report on the spectrophotometric, electrochemical, chromatographic and spectroscopic processes.	• Lab Work. • Class discussion and research activity	• Assignments and activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	--	10 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
2	Midterm Exam.	5	20 %
3	Practical Exam.	11	30 %
4	Final Exam. (2hours Exam)	12	40 %
5	**Total**		100%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- We have faculty members to provide counselling and academic advice.
- 2 hours per week as office hours are available for discussion with the students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, ***Analytical Chemistry***, 7th edition, WILEY (2014) • Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, ***Analytical Chemistry***, 7th edition, Springer (2014) • Dhruba Charan Dash. ***Analytical Chemistry***) PHI Learning Private Limited, 2017.
Essential References Materials	Lecture handouts available on the coordinator website
Electronic Materials	• **http://www.chemweb.com** • **http://www.sciencedirect.com** • **http://www.rsc.org**
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms capacity (30) students. • Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Room equipped with computer and projector and TV
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• **No other requirements.**

G. Course Quality Evaluation

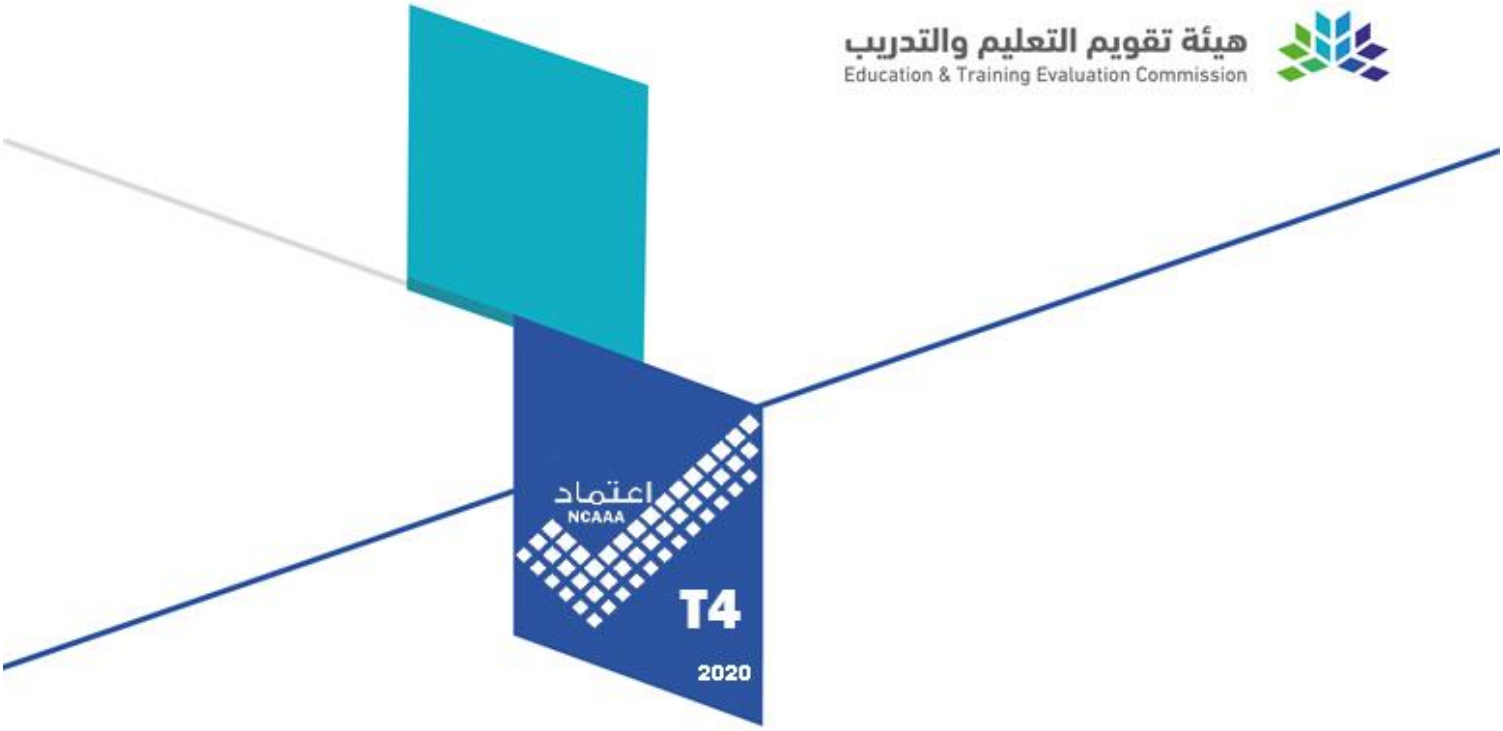
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty Indirect (feedback from faculty and students).
Quality of learning resources	Students	Direct (feedback from faculty). Indirect (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	01.04.2022

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Marine Chemistry and Oil Spill**
Course Code:	
Program:	**Environmental Science**
Department:	**Chemistry**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 2hrs
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: 11th level/4th year
4. Pre-requisites for this course (if any)**: Waste treatment**
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**	---	---

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	---
3	**Tutorial**	---
4	**Others** (Office hours)	6
	Total	26

B. Course Objectives and Learning Outcomes

1. Course Description

This course covered many aspects of marine chemistry as geochemical mass balance in addition of oil spills remediation using different methods.

2. Course Main Objective

By finishing the course, the students will have all information about both:

1- A background of chemical oceanography.
2- A description of how chemical elements in seawater and ocean sediments can be used as tracers of physical, biological, chemical and geological processes in the ocean.
3- Modeling of oil spills and their remediation.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Describe the dissolved chemicals and biology in the sea	K1
1.2	Outline stable and radioactive isotopes in marine life.	K3
1.3	Identify the chemical background of life processes in the ocean	K2
1.4	Predict a suitable remediating oilfield waste and spills	K3
2	**Skills :**	
2.1	Choose the suitable technologies for remediation of oil spills	S2
2.2	Employ modeling oil spills in water	S3
2.3	Use surfactant technologies for remediation of oil spills	S6
3	**Values:**	
3.1	Demonstrate commitment to professional and academic values, and ethics in the field of marine chemistry	V1
3.2	Write and present a chemical report related to oil spills and their remediation.	V4

C. Course Content

No	List of Topics	Contact Hours
1	Oceanography background: dissolved chemicals and biology in the sea	2
2	Geochemical mass balance	2
3	Carbonate chemistry	2
4	Stable and radioactive isotopes	2
5	Life processes in the ocean	2
6	Gases and air–water exchange	2
7	Chemical reactions in marine sediments	2
8	Modeling oil spills in water – Oil films: some basic concepts	2
9	Remediating oilfield waste and spills	2
10	Surfactant technologies for remediation of oil spills	2
Total		**20**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Describe the dissolved chemicals and biology in the sea	Lectures	Exams
1.2	Outline Stable and radioactive isotopes in marine life.	Lectures Library visits Web based study.	Assignments and activities
1.3	Identify the chemical background of life processes in the ocean	Lectures	Final and mid-term exam.
1.4	Predict a suitable remediating oilfield waste and spills	Lectures	Exams
2.0	**Skills**		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Choose the suitable technologies for remediation of oil spills	Lectures	Quiz.
2.2	Employ modeling oil spills in water	Lectures	Final and mid-term exam.
2.3	Use surfactant technologies for remediation of oil spills	Lectures	Quiz.
3.0	**Values**		
3.1	Demonstrate commitment to professional and academic values, and ethics in the field of marine chemistry	Web-based study	Class discussion
3.2	Write and present a chemical report related to oil spills and their remediation.	Scientific discussion	Assignment activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	-	10%
2	First Periodic Exam.	4	20%
3	Second Periodic Exam.	10	20%
4	Final Exam. (2 hours exam)	12	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- A faculty member was assigned to provide counseling and advice (about 20-25 student/ one faculty member).
- Office hours of the instructor: during the working hours weekly.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Chemical Oceanography and the Marine Carbon Cycle, Steven Emerson John Hedges School of Oceanography, University of Washington, USA, S. R. Emerson and J. I. Hedges 2008 • Oil Spill Remediation, Colloid Chemistry-Based Principles and Solutions, P. Somasundaran, P. Patra, R.S. Farinato, K. Papadopoulos, 2014 by John Wiley & Sons, Inc. All rights reserved.
Essential References Materials	Electronic lecture handouts are available for the students either on blackboard or via their e-mail
Electronic Materials	Chemistry related web sites such as: http://www.chemweb.com http://www.sciencedirect.com http://www.rsc.org
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with capacity of (30) students.
Technology Resources (AV, data show, Smart Board, software, etc.)	Teaching halls and laboratories are equipped with data show projector ad electronic board screen
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Some Specialized software's for chemistry e.g. Institutional License for Chem Office , ACD labs, etc.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Preformat
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty
Quality of learning resources	Students	Direct (feedback from faculty).

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

H. Specification Approval Data

Council / Committee	Quality committee and department Council
Reference No.	
Date	02.04.2022

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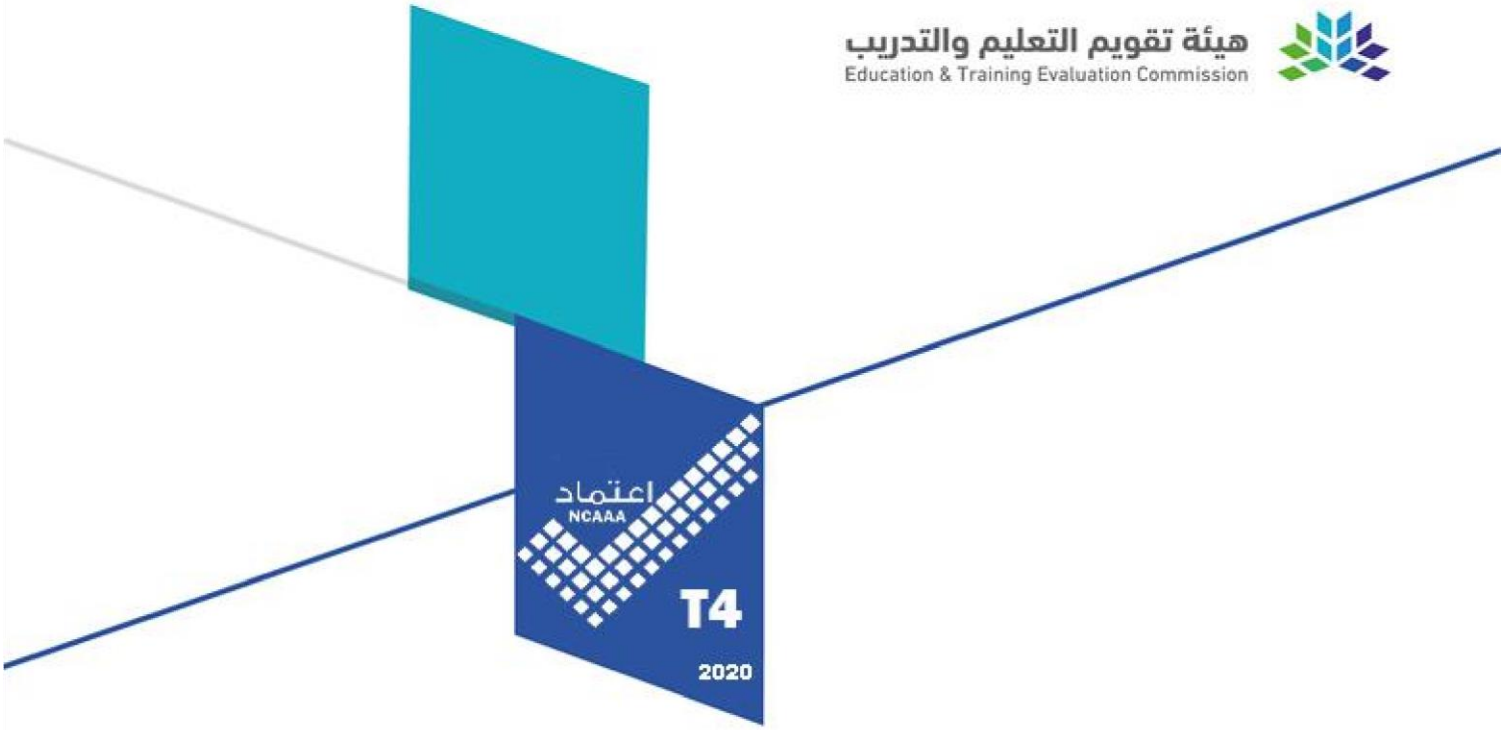
Education & Training Evaluation Commission



Course Specifications

Course Title:	Introduction to Calculus
Course Code:	MTH1101-4
Program:	BSc. in Mathematics
Department:	Mathematical sciences
College:	Sciences
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:	**4**
2. Course type	
a.	University ☐ College ☐ Department ☒ Others ☐
b.	Required ☒ Elective ☐
3. Level/year at which this course is offered:	**First level/First year**
4. Pre-requisites for this course (if any)**:**	**None**
5. Co-requisites for this course (if any)**:**	**Not applicable**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**Four hours/week**	**%100**
2	**Blended**	0	0
3	**E-learning**	0	0
4	**Distance learning**	0	0
5	**Other**	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**36**
2	**Laboratory/Studio**	**0**
3	**Tutorial**	**0**
4	**Others** (Exam, Quizzes, Activities,…)	**6**
	Total	**40**

B. Course Objectives and Learning Outcomes

1. Course Description

This introductory calculus course covers differentiation and integration of functions of one variable. It is the first in a three-course sequence of calculus. Key topics of the course include precalculus, limits and continuity, derivatives, integrals.

2. Course Main Objective

The primary objective of the course is to introduce students to the concepts of calculus and to develop the student's confidence and skill in dealing with mathematical expressions. To achieve this goal, the course will help the student understand the following basic concepts: limits, continuity , derivatives and integration involving real-valued functions of one variable (including algebraic and trigonometric functions).

	CLOs	Aligned PLOs
1	**Knowledge and Understanding: by the end of this course, the student is expected to be able to**	

3. Course Learning Outcomes

CLOs		Aligned PLOs
1.1	Recognize the characteristics of a function expressed in symbolic or graphic form.	
1.2	Outline the definitions of limits and continuity of a single-variable function and related theorems.	
1.3	Define the basic concept of a derivative of a single-variable function and learn the different rules, formulas and theorems for computing the derivative of a function in calculus.	
1.4	Define the basic concepts and techniques of integration of polynomial, rational, and trigonometric functions.	
2	**Skills: by the end of this course, the student is expected to be able to**	
2.1	Analyze functions represented in a variety of ways: graphical, numerical or analytical	
2.2	Determine the limits of functions and their continuity at points or on intervals.	
2.3	Calculate the derivative of various type of functions using the rules and techniques of differentiation.	
2.4	Evaluate integrals of real functions using basic rules and techniques of integration.	
3	**Values: by the end of this course, the student is expected to be able to**	
3.1	Apply the computational and conceptual principles of calculus to the solutions of various mathematical problems.	
3.2	Justify the choice of different steps in problem resolution procedure.	
3.3	Solve problems using a range of formats and approaches in basic science.	
3.4	Show the ability to work independently and within groups.	

C. Course Content

No	List of Topics	Contact Hours
1	**Pre Calculus:** (i) Exponents and Radicals. (ii) Solving Equations. (iii)Inequalities and Absolute Values. (iv) Lines	8

2	**Functions** (i) Functions: Definition, Graphs and Operations (ii) Trigonometric Functions and Identities.	4
3	**Limits and Continuity:**	8
	(i) Introduction to Limits (ii) Theorems on limits (iii) Limit at infinity and infinite limits (iv) Continuity	
4	**Differentiation** (i) Definition of Derivative (Using Limits) (ii) Rules and Theorems for Finding Derivatives (iii)Derivative of Trigonometric Function (iv)Chain Rule (v) Higher Order Derivatives	10
5	**Integration** (i) Antiderivatives. (ii) Fundamental Theorems of Calculus.	4
6	**Others** Preprimaries, Quizzes, Activities …	6
	Total	40

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize the characteristics of a function expressed in symbolic or graphic form.	Lecture and Tutorials	Exams, quizes
1.2	Outline the definitions of limits and continuity a single-variable function and related theorems.	Lecture and Tutorials	Exams, quizes
1.3	List the different rules, formulas and theorems for computing derivatives of functions.	Lecture and Tutorials	Exams, quizes
1.4	Define the basic concepts and techniques of integration of polynomial, rational, and trigonometric functions.	Lecture and Tutorials	Exams, quizes

2.0	**Skills**		
2.1	Analyze functions represented in a variety of ways: graphical, numerical or analytical.	Lecture/Individual or group work	Exams, quizes
2.2	Determine the limits of functions and their continuity at points or on intervals.	Lecture/Individual or group work	Exams, quizes
2.3	Calculate the derivative of various type of functions using the rules and	Lecture/Individual or group work	Exams, quizes
Code	**Course Learning Outcomes**	**Teaching Strategies**	**Assessment Methods**
	techniques of differentiation.		
2.4	Apply the concept of derivative to completely analyze graph of a function.	Lecture/Individual or group work	Exams, quizes
2.5	Evaluate integrals of real functions using basic rules and techniques of integration.	Lecture/Individual or group work	Exams, quizes
3.0	**Values**		
3.1	Apply the computational and conceptual principles of calculus to the solutions of various mathematical problems.	Lecture/Individual or group work	Exams, quizes
3.2	Justify the choice of different steps in problem resolution procedure.	Lecture/Individual or group work	Exams, quizes
3.3	Solve problems using a range of formats and approaches in basic science.	Lecture/Individual or group work	Exams, quizes
3.4	Show the ability to work independently and within groups.	Lecture/Individual or group work	Exams, quizes

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	maxetmM tdiM	kade tttS	30%
2	skaotQ ihx zMttzmSQ	rkmahm QtMtQetm	20%
3	mahi tdiM	rhx zm QtMtQetm	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

All faculty members are required to be in their offices outside teaching hours. Each member allocates at least 4 hours per week to give academic advice to students and to better explain the concepts seen during the lectures.
Students are required to complete the homework problems. Students are welcome to work together on homework. However, each student must turn in his or her own assignments, and no copying from another student's work is permitted. Deadline extensions for homework will not be given. Students are encouraged to discuss with professor about homework problems.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Calculus (9th Edition), Dale Varberg, Edwin Purcell and Steven Rigdon, Prentice Hall (2006).
Essential References Materials	Thomas' Calculus (14th Edition), George B. Thomas Precalculus: Mathematics for Calculus (6th Edition), James Stewart
Electronic Materials	None
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data Show, Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	ezht

G. Course Quality Evaluation

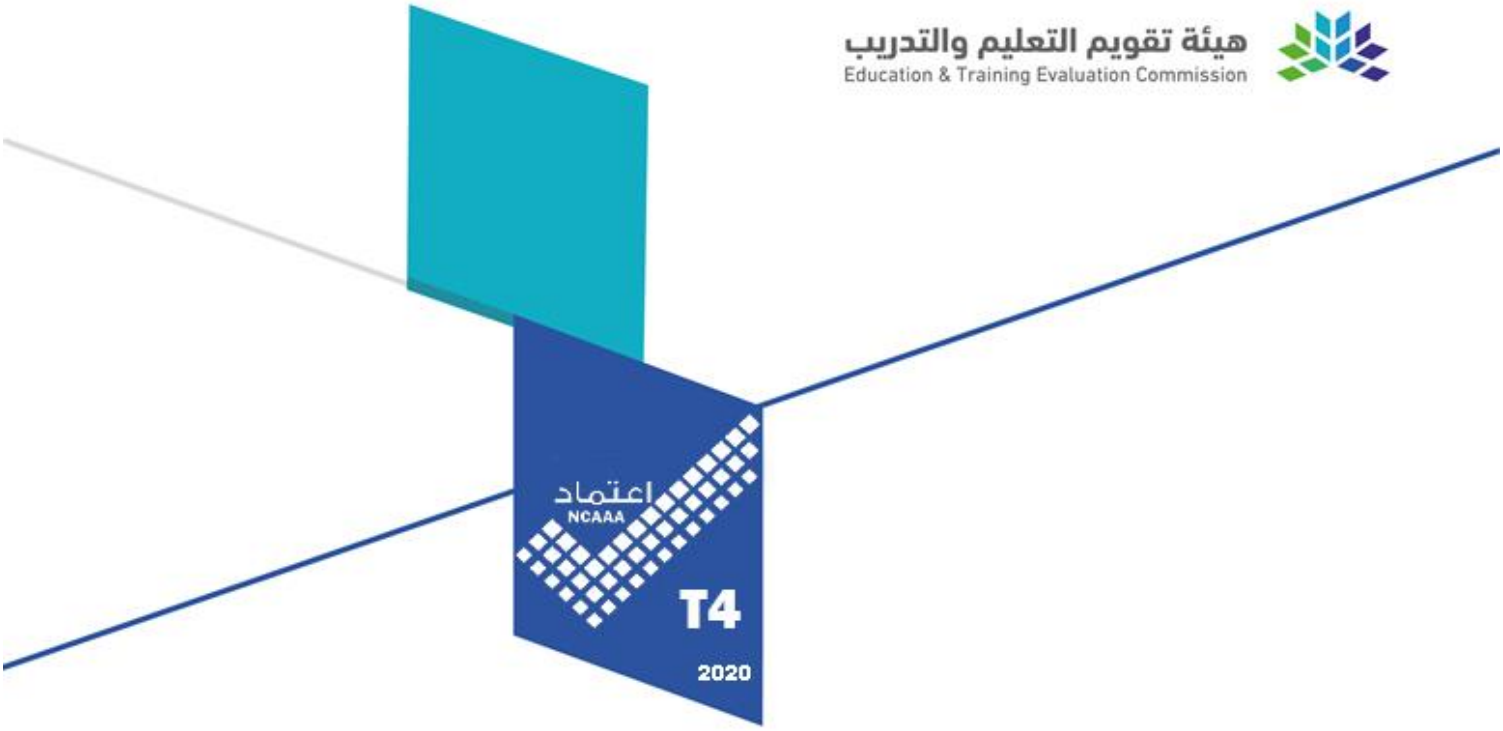
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Direct
Quality of learning resources	Students	Direct
Extent of achievement of course learning outcomes	Faculty Member	Direct

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Natural environments in Saudi Arabia**
Course Code:	
Program:	**Environmental Science**
Department:	Biology
College:	Faculty of Science
Institution:	Umm Al- Qura University
Course Coordinator:	

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level 1, first year
4. Pre-requisites for this course (if any)**: Non**
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	72	70 %
2	**Blended**		
3	**E-learning**	9	10 %
4	**Distance learning**	9	10 %
5	**Other**	9	10 %

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	9
4	**Others** (specify)	19
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course reviews a general and comprehensive overview of the different and diverse natural geographical and plant environments in the Kingdom of Saudi Arabia. And the relationship of the quality of environments to climate change and the impact of environmental impacts and risks on plants and biodiversity. And the types of natural environments with their geographical location and the different forms of plant patterns they contain. And ways to protect, preserve and regulate the natural environments in the Kingdom, and the policies used to preserve it.

2. Course Main Objective

The main objective of the course is for the student to have a close knowledge of the various and diverse natural, geographical and plant environments in the Kingdom of Saudi Arabia through the theoretical and practical aspects of the course. Gain detailed knowledge of the specific relationship of environments to climate change and the impact of environmental

impacts and risks on plants and biodiversity. And the types of natural environments with their geographical location and the different forms of plant patterns they contain, through periodic scientific trips carried out by the Department. And that the student knows the ways to protect, preserve and regulate the natural environments in the Kingdom and the policies used to preserve them, and at the end of the semester, he evaluates the status of these natural environments and submits appropriate proposals to preserve, protect and develop them.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	On completion of the course the students should be familiar with basic principles and methods in Natural environments in Saudi Arabia.	
1.2	Knowledge and learning capabilities: understand the concepts and principles of Natural environments in Saudi Arabia.	
1.3	Applied knowledge: learning experimental designs to do research in Natural environments.	
1.4	Self-learning: develop research abilities through bibliographic research, synthesis capacity and interpretation of Natural environments in experiments.	
2	**Skills :**	
2.1	The student will be able to: identify and distinguish between natural and non-natural environments through data analysis of the collected environmental elements.	
2.2	Determine the extent to which the natural environment is viable, stable, evolving, or susceptible to deterioration.	
2.3	analyzing and evaluating the causes of the persistence or deterioration of the natural environment.	
2.4	identify the most important components of biodiversity in every natural environment and the role of these components in the ecological balance.	
2.5	ability to conduct environmental studies and analyzes of the elements of the natural environment and his ability to use these different methods and devices.	
3	**Values:**	
3.1	Knowing the importance of values: honesty, sincerity, loyalty and transparency in the scientific, practical and community life.	
3.2	Respecting and understanding the value of teamwork and working within the group.	
3.3	The study of this course can enhance the student's belief in God by discovering the Processes of formation, continuity, stability, balance, biodiversity and the integration of natural environments, which insure the continuation of life.	
3.4	Understand the value and importance of time and work. .	

C. Course Content

No	List of Topics	Contact Hours
1	**The Environment.** **Climate and environmental change.**	2

	Environmental impacts and hazards.	
2	**-Geographical plant areas in the Kingdom of Saudi Arabia.** **-The first region: the western coastal plain.** **-The second region: the Hijaz Mountains or the Sarawat mountain range.**	**2**
3	**-The third region: the western plateaus.** **-The fourth region: the central plateau.**	**2**
4	**-The fifth region: the eastern region.** **-The sixth region: Northern regions.**	**2**
5	**-The seventh region: the region of influence.** **-The eighth region: The Empty Quarter.**	**2**
6	**The different types of environments in Saudi Arabia:** **First:- marine environments** 1- Coral reefs. 2- Seaweed. 3- Shura plants (corm). 4- Salt marshes. 5- Bays (Al-Shurum, Al-Marassi and Al-Doha).	**2**
7	**Second: The natural terrestrial environments** 1- Islands. a) Tiran and Sanafir islands at the entrance to the Gulf of Aqaba b) Farasan Islands group in the Red Sea 2- Wet areas. 3- Valleys. 4- Mountain edges and mountains.	**2**
8	5- Mountain forest areas. 6- Al-Harat. 7- The gravel plains and the Hammad plains. 8- Sandy deserts. **Growth types (Types of Plant Life).**	**2**
9	**The plant in the environment in which it grows, such as:** **A- Types of the plants Cryptophytes;** 1- Hanging plants: 2- Succulent plants: 3- Superficial plants: **B- Hemicryptophytes:** 4- Terrestrial plants: 5- Aquatic plants: 6- Parasitic plants:	**2**
10	**- Annual and seasonal plants:** **- Wild medicinal plants**	**2**
11	**Environmental protection, regulation and policy**	**2**
12	**Final exam**	
13	**Final exam**	
Total		**22**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	On completion of the course the students should be familiar with basic principles and methods in Natural environments in Saudi Arabia.	data show to explain the topics scheduled - Showing some documentaries that relate to course-identify. Lectures. Video tapes, CDs and DVDs (audiovisuals) .Assignments (essays and oral presentation).Tutorials. Accelerated learning (learning by fun). Mind maps. -The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. - At the end of the programme, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course. - All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions. - Using images and movies	-Quarterly and final tests(objective tests and essay and oral). - Reports. - Projects. - Debates and questions.
1.2	Knowledge and learning capabilities: understand the concepts and principles of Natural environments in Saudi Arabia.		
1.3	Applied knowledge: learning experimental designs to do research in Natural environments.		
1.4	Self-learning: develop research abilities through bibliographic research, synthesis capacity and interpretation of Natural environments in experiments.		
2.0	**Skills**		
2.1	The student will be able to: identify and distinguish between	**Cognitive Skills:** Discussions and	- Quarterly periodic tests and final.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	natural and non-natural environments through data analysis of the collected environmental elements.	periodic tests during the theoretical lectures - joint research work between the students and make some individual duties- Practical application of the topics scheduled in the lab – the periodic exams during practical lessons**.** Practical studies. Browsing in internet. Self-studies to be included in exams. Homework. Presentations by students. Lectures. **Interpersonal Skills and Responsibility:** Participate in groups to research work. The implementation of all of the students assigned to the tasks and duties during the theoretical and practical lessons**.** Oral presentation lecture about the project presented by students and discussed with them after distributing the students into groups to encourage the teamwork. - Full essay about the project, group work. **Numerical and Communication Skills:** Communication via the World Wide Web with the professor to present research and movies. The use of laboratory equipment. The use of different computer programs**.**	- Evaluation of short research - Evaluation of offers. - Required activities and duties -Giving additional marks for the students they have accurate laboratory results and good seminar presentation -Practical exam. -Semi- periodic examinations and productive discussions. -Assess the students in practical lessons. -Home business to assess and discuss the students. -Assess the skills of preparing research. -Evaluation of the students in the indirect decision of the syllabus.
2.2	Determine the extent to which the natural environment is viable, stable, evolving, or susceptible to deterioration.		
2.3	analyzing and evaluating the causes of the persistence or deterioration of the natural environment.		
2.4	identify the most important components of biodiversity in every natural environment and the role of these components in the ecological balance.		
2.5	ability to conduct environmental studies and analyzes of the elements of the natural environment and his ability to use these different methods and devices.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Students are asked to prepare and present a lecture about subject related to the course using a power point programme. Students are asked to write a short essay about subject related to the course, which will encourage them to search for the knowledge in the proper references in form of (scientific books or journals and internet sites). - Lectures -Brain storming -Discussion. - Follow up students the students in lab and during carryout all the laboratory experiments	
3.0	**Values**		
3.1	Knowing the importance of values: honesty, sincerity, loyalty and transparency in the scientific, practical and community life.	giving students examples of the importance of these values and their role in strengthening relationships in scientific, practical and societal life	Observing students during work and dealing with each other and tests.
3.2	Respecting and understanding the value of teamwork and working within the group.	Distributing students into groups and emphasizing that teamwork gives better payoff from individual work and promotes progress	Observing students during work and dealing with each other and tests.
3.3	The study of this course can enhance the student's belief in God by discovering the Processes of formation, continuity, stability, balance, biodiversity and the integration of natural environments, which insure the continuation of life.	giving students examples of the importance of Natural environments.	During my discussions with the students and their interest and understanding of the course
3.4	Understand the value and importance of time and work. .	Distributing students into groups and	Observing students while working in

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		emphasizing that teamwork gives better payoff from individual work and promotes progress	theoretical and practical groups

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodical Exam (s)	4	10 %
2	Mid Term Exam (Theoretic)	8	20 %
3	Mid Term Exam (practical)	9	10 %
4	Reports and essay	11	10 %
5	Final Exam	12	50 %
6			
Total Marks			100%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Faculty and teaching staff are always available for individual student counseling and academic advice.

-Course lecturers are happy to answer all students' quires during or after the lectures, and they can be reached by personal meeting, phones or emails.

-All students have the e-mail of the course lecturer.

-Office hours for the course organizer and lecturer of the course are given to students, this is at least 10 hours per week.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- Saudi Arabia: An Environmental Overview. Peter Vincent.2007. London. - Vegetation & Biogeographyof The Sand Seas Of Arabia. David Watts, Abdulatif Al-nafie.2003. London. - Flora Of Eastern Saudi Arabia. James P. Mandaville. 1990. London. الجغرافيا النباتية للمملكة العربية السعودية. عبد اللطيف حمود النافع.2004. الرياض- - Migahid, A., (1988). *Flora of Saudi Arabia*, King Saud University, Riyadh. - Mandavill, J, (1990). *Flora of Eastern Saudi Arabia*, Kegan Paul International, London and New York, jointly with National Commission for Wildlife Conservation and Development (NCWCD), Riyadh. - Heemstra, H., Al Hassan H. and Al Minwer F., (1990). *Plants of Northern Saudi Arabia, An Illustrated Guide*. Ministry of Agriculture and Water, Range and Animal Development Research Centre, Al-Jawf, Saudi Arabia.

Essential References Materials	
Electronic Materials	
Other Learning Materials	Power Point is of high scientific value and craftsmanship made by the lecturer

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	data show, Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	-Continuous Excitation Chlorophyll Fluorescence -Plant Canopy Analyzer -Digital Plant Moisture System -Portable Photosynthesis System IRGA and stomatal conductance -Weather station with below sensors

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching	Students	-Questionaries -Open discussion in the class room at the end of the lectures.
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department	The Instructor or by the Department	-Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental plan committee.
3. Processes for Improvement of Teaching: -Preparing the course as PPT. -Using scientific movies. -Coupling the theoretical part with laboratory part -Periodical revision of course content…. etc.	Students	-Revision of student answer paper by another staff member. -Analysis the grades of students.
4. Processes for Verifying Standards of Student Achievement	Peer Reviewer	(eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of

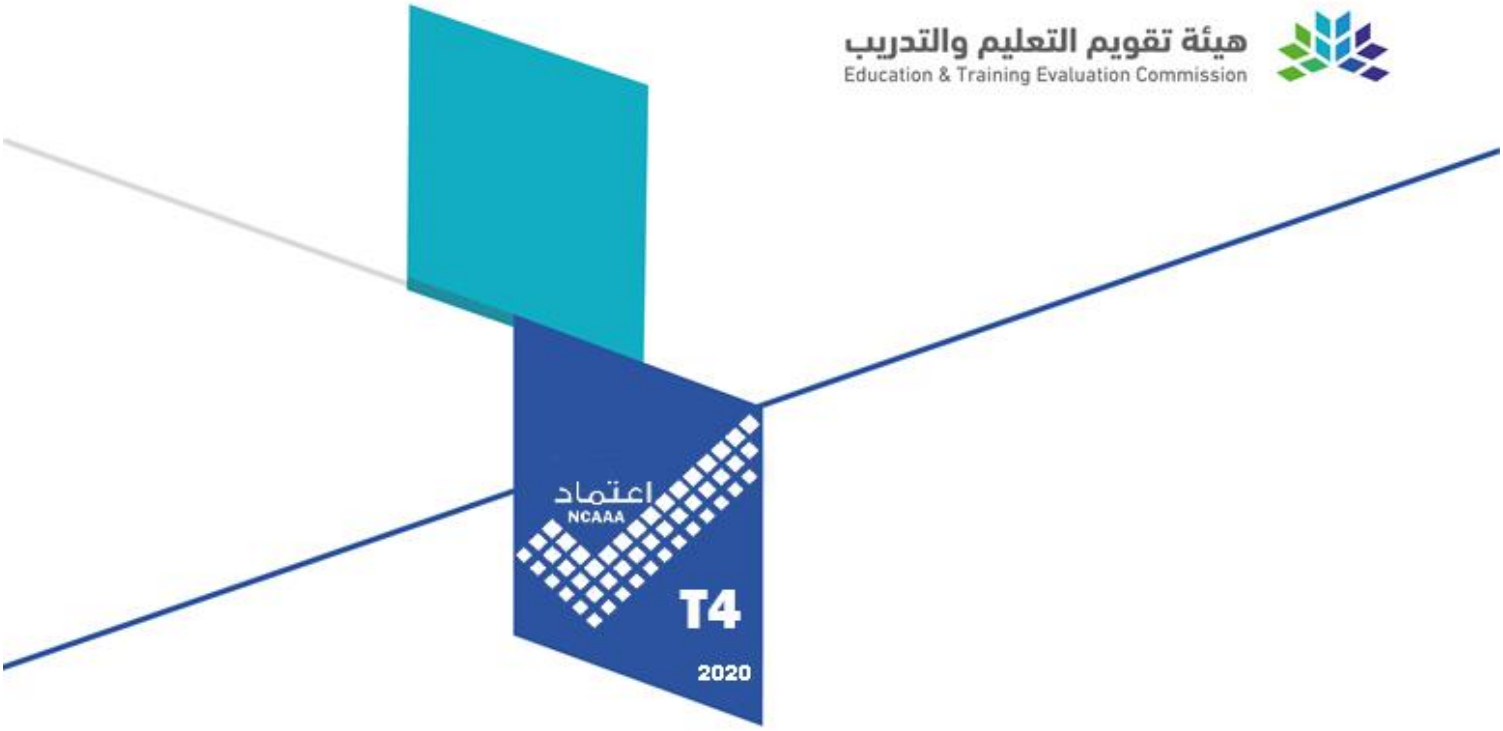
Evaluation Areas/Issues	Evaluators	Evaluation Methods
		assignments with a faculty member in another institution). After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.	Program Leaders	Periodical revision by Quality Assurance Units in the Department and institution

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Natural resource management and environmental protection**
Course Code:	**2hrs/ Week (2Lec.)**
Program:	**Environmental Science**
Department:	**Biology Department**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **2h.**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Level 10, Fourth year
4. Pre-requisites for this course (if any)**: Environmental monitoring and assessment**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**80%**
2	**Blended**		
3	**E-learning**		**20%**
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	
3	**Tutorial**	10 h
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This subject gives an overview of how environmental scientists manage natural resources. Topics include an introduction to environmental systems, classification of natural resources, their multi-disciplinary and complex nature, and approaches to managing them. On completion, students have a comprehensive understanding of the nature of environmental systems and the ability to apply their knowledge and skills to make sound judgments regarding courses of action to achieve conservation in a range of contexts.

2. **Course Main Objective**

The student will be able to:

- To understand general principles of natural resource management and
- classification of natural resources.
- Taught the damage process and action of natural resources.
- Differentiate between resource management regime and international resource management regime.
- To assess the challenges between agricultural productivity and environmental protection.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	To understand general principles of natural resource management and classification of natural resources.	K1
1.2	Taught the damage process and action of natural resources.	K1
1.3	Differentiate between resource management regime and international resource management regime	K1
2	**Skills :**	
2.1	Identify, analyze and critically explain a variety of conceptual and methodological frameworks that are important to understanding environmental and natural resource	S1
2.2	students learn how to use critical thinking skills to convey how society perceives what natural resource management is	S2
2.3	make critical and independent assessments of methods and results.	S2
2.4	continuously develop his/her professional competence.	S2
2.5	be able to communicate subject matter and scientific results both to specialists and to a broader audience and be able to formulate scientific reasoning/argumentation.	S3
3	**Values:**	
3.1	know important aspects of environmental pollution, understand this discipline's role in society, and assess ethical issues within this field.	V1
3.2	be able to acquire, evaluate and adopt relevant and reliable new information.	V2
3.3	have the background to carry out/solve advanced tasks and projects, both independently and in teams, and have the ability to assess her/his efforts in projects.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Natural Resources Management: Concept of resource, classification of natural resources. Factors influencing resource availability, distribution, and uses. Interrelationships among different types of natural resources. Concern about Productivity issues. Ecological, social, and economic dimensions of resource management.	2
2	**Forest resources:** forest vegetation, status and distribution, major forest types, and their characteristics. Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people, forest	2

	management. Developed world strategies for forestry.	
3	**Land resources:** Land as a resource. Dryland, land use classification, land degradation, man-induced landslides. Landscape impact analysis, wetland ecology & management.	2
4	**Water resources:** Use and over-utilization of surface and groundwater, floods, drought, conflicts over water, dams-benefits, and problems. Water ecology and management.	2
5	Mid-Term I	2
6	**Food resources:** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity	2
7	**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies	2
8	Management of Common International Resources: Ocean, climate, International fisheries and management commissions; Antarctica: the evolution of an international resource management regime.	4
9	**Case Studies:** 1. Resource management in mountain ecosystem 2. Dry-land ecosystem 3. The management of marine and coastal resources 4. Case study of shifting cultivation 5. Mangrove ecosystem and their management	2
10	Mid-Term II	2
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	To understand general principles of natural resource management and classification of natural resources.	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class. -Handout of lecture notes for each topic . -Small group discussions.	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports • Oral presentation
1.2	Taught the damage process and action of natural resources.		
1.3	Differentiate between resource management regime and international resource management regime		
2.0	**Skills**		
2.1	Identify, analyze and critically explain a variety of conceptual and methodological frameworks that are important to understanding environmental and natural resource	• Application of essential scientific techniques through lectures and essays. • Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). •Homework assignments	-Evaluation of the topics prepared by students. -Midterm and final exams -Checking the homework assignments
2.2	students learn how to use critical thinking skills to convey how society perceives what natural resource management is		
2.3	make critical and independent assessments of methods and results.		
2.4	continuously develop his/her professional competence.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.5	be able to communicate subject matter and scientific results both to specialists and to a broader audience and be able to formulate scientific reasoning/argumentation.		
3.0	**Values**		
3.1	know important aspects in environmental pollution, understand this discipline's role in society, and assess ethical issues within this field.		• Assignments (Individual and group) • Presentation (Individual and group) assessments. • Research search assignments
3.2	be able to acquire, evaluate and adopt relevant and reliable new information.		
3.3	have the background to carry out/solve advanced tasks and projects, both independently and in teams, and have the ability to assess her/his efforts in projects.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam I	5th	20
3	Mid-term Exam II	9th	20
4	Final Exam (written test)	11th	50
5			

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.
- Laboratory assistance.
- E-mail communications.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	• Harris, J.M. 2006. Environmental and Natural Resource Economics: A Contemporary Approach, 2nd edition. Houghton Mifflin. • Barber, E. 1989. Economics: Natural Resources Scarcity and Development. Earthscan. • Funda Varnaci Uzun , (2018) Natural Resources Management, DOI: 10.4018/978-1-5225-3194-4.ch001
Essential References Materials	

Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Library.
Technology Resources (AV, data show, Smart Board, software, etc.)	•Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

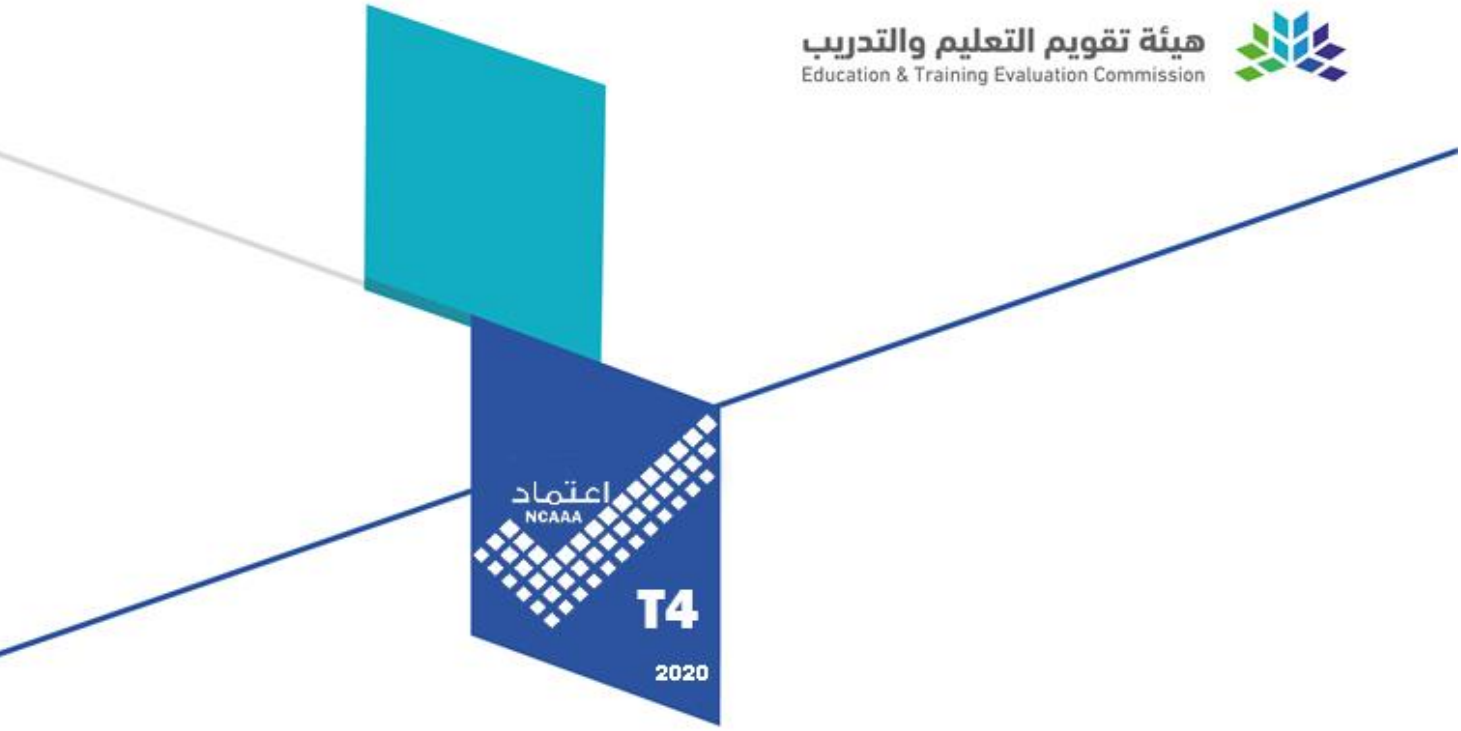
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Organic Spectroscopy**
Course Code:	**Not yet defined**
Program:	**Environmental Science**
Department:	**Chemistry**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 3h. (2 theoretical + 1 Practical)
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: 8th level/ 3rd year
4. Pre-requisites for this course (if any)**: Fundamentals of Organic chemistry**
5. Co-requisites for this course (if any)**:** -----

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**	---	---

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	27
3	**Tutorial**	--
4	**Others** (specify)	6
	Total	53

B. Course Objectives and Learning Outcomes

1. Course Description This course is designed to help the students to understand and recognize the characterization techniques of organic compounds by different spectroscopic tools and how to determine the chemical structure of organic molecules.
2. Course Main Objective By the end of this course, students should be able to correctly deduce the structure of an unknown org anic molecule from a set of spectra.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize the general principals and theoretical basis of different types of spectroscopy.	K1
1.2	Select the suitable spectroscopic tool for confirmation of compounds	K2
1.3	Identify the functional groups in organic compound using spectroscopy	K2
1.4	Familiar with the factors affecting absorption frequency	K1
2	**Skills:**	
2.1	Practice the spectroscopic tools for different organic compounds.	S3
2.2	Determine the structure of compounds by spectroscopy	S2
2.3	Match the structure of the compounds with the spectroscopic data	S2
2.4	Distinguish between compounds by spectroscopy	S2
2.5	Estimate the spectroscopic values of organic compounds	S1
2..6	Choose the suitable spectroscopic tool for confirmation of compounds	S2
3	**Values:**	
3.1	Write and present a chemical report related structural elucidation of organic compound	V4
3.2	Work individually and in a team to perform a specific experiment or preparing a report on the spectroscopic tools	V3

C. Course Content

No	List of Topics	Contact Hours
1	Theoretical principles of spectroscopy.	2
2	UV absorption spectroscopy: Principles and applications.	4
3	IR spectroscopy: Principles, experimental aspects and interpretation.	4
4	NMR spectroscopy: Types, principles, and applications.	4
5	Mass Spectrometry (MS): Ionization process, instrumentation and common types of fragmentation processes.	2
6	Spectroscopic identification of Organic compounds: how to use the synergistic information afforded from the combination of mass, UV, IR and NMR spectra to identify the structure of an organic molecule.	4
Total		20

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize the general principals and theoretical basis of different types of spectroscopy.	• Lectures	• Quiz. • Final and mid-term exam.
1.2	Select the suitable spectroscopic tool for confirmation of compounds	• Lectures • Lab work	• Quiz.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			• Final and mid-term exam. • Lab exam
1.3	Identify the functional groups in organic compound using spectroscopy	• Lectures	• Quiz. • Final and mid-term exam.
1.4	Familiar with the factors affecting absorption frequency	• Lectures	• Quiz. • Final and mid-term exam.
2.0	**Skills**		
2.1	Practice the spectroscopic tools for different organic compounds.	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab exam.
2.2	Determine the structure of compounds by spectroscopy	• Lectures	• Final and mid-term exam.
2.3	Match the structure of the compounds with the spectroscopic data	• Lectures	• Quiz. • Final and mid-term exam. • Assignments and activities
2.4	Distinguish between compounds by spectroscopy	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab. Work.
2.5	Estimate the spectroscopic values of organic compounds	• Lectures	• Quiz. • Final and mid-term exam. • Assignments and activities
2..6	Choose the suitable spectroscopic tool for confirmation of compounds	• Lectures	• Quiz. • Final and mid-term exam.
3.0	**Values**		
3.1	Write and present a chemical report related structural elucidation of organic compound	• Lab work • Library visit.	• Quiz. • Lab report
3.2	Work individually and in a team to perform a specific experiment or preparing a report on the spectroscopic tools	• Lab work • Library visit.	• Assignments and activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	--	10 %
2	First Periodic Exam.	5	20 %
3	Practical Exam.	11	30 %
4	Final Exam.	12	40 %
5	Total	100 %	

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- We have faculty members to provide counselling and academic advice.
- 2 hours per week as office hours are available for discussion with the students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Pavia, D.; Lampman, G.M.; Kriz, G.S.; Vyvyan, J.R. Introduction to Spectroscopy, 4th Edition, 2009, Belmont : Brooks/Cole, Cengage Learning. • Silverstein, R.M.; Webster, F.X.; Kiemle, D.J. Spectrometric Identification of Organic Compounds. 7th edition, 2005, N.Y.: John Wiley & Sons, Inc. • Prof.Dr.AbdullahM.Asiri, Maha M. Al-Otaibi "*Spectroscopic Methods in Organic Chemistry*" 1st Edition, 2012.
Essential References Materials	• Lecture Handouts available on the coordinator website
Electronic Materials	• http://www.chemweb.com • http://www.sciencedirect.com • http://www.rsc.org
Other Learning Materials	• Microsoft Power Point, Excel and Microsoft Word • Professional standards or regulations and software • Computer-based programs/CD

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms capacity (30) students. • Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Room equipped with computer and projector and TV
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	------

G. Course Quality Evaluation

Evaluation	Evaluators	Evaluation Methods

Areas/Issues		
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty Indirect (feedback from faculty and students).
Quality of learning resources	Students	Direct (feedback from faculty). Indirect (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	25.03.2022

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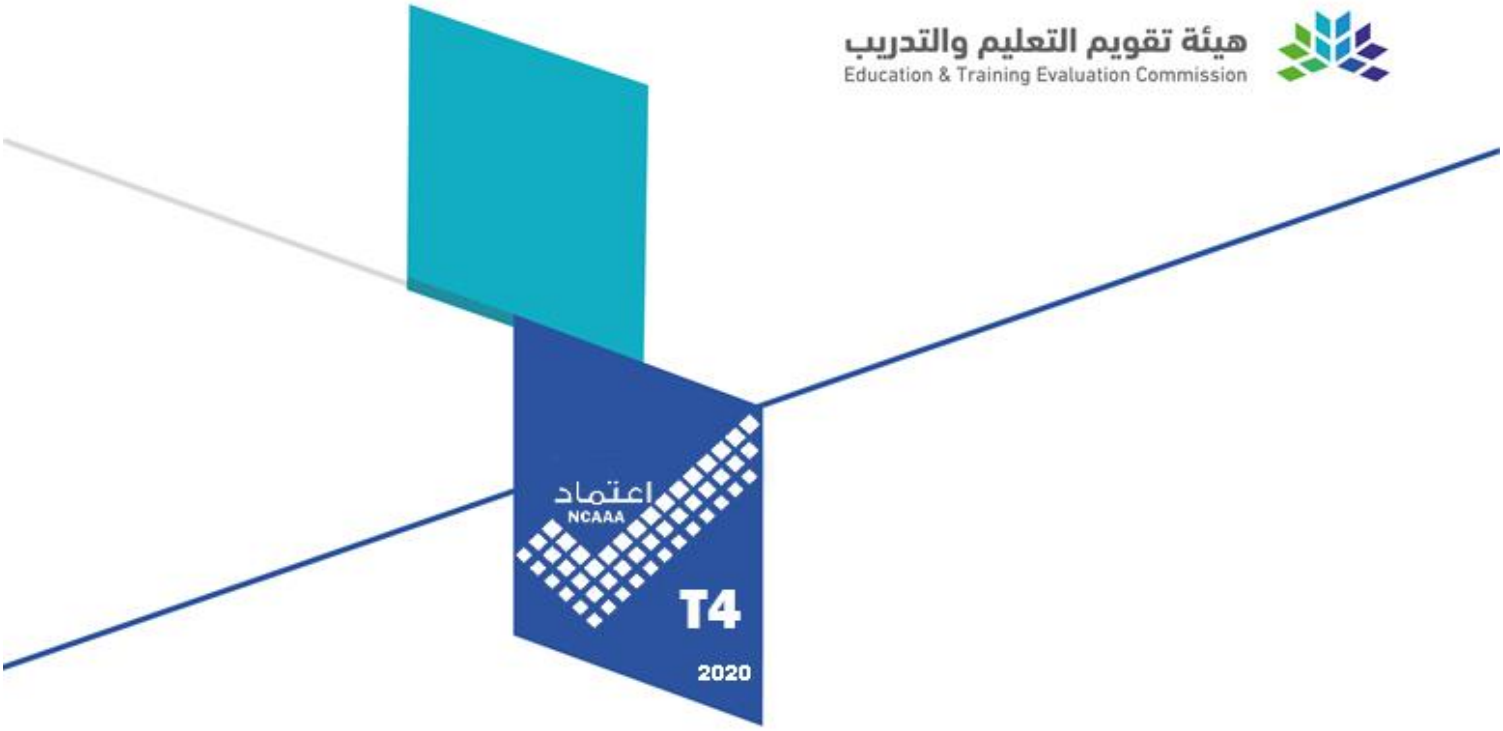
Education & Training Evaluation Commission



Course Specifications

Course Title:	Plant Morphology and Anatomy
Course Code:	3hrs/ Week (2Lec. & 3Lab.)
Program:	**Environmental Science**
Department:	**Biology Department**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **3h.**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Second level, First year
4. Pre-requisites for this course (if any)**: General Biology**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**80%**
2	**Blended**		
3	**E-learning**		**20%**
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	30 h
3	**Tutorial**	10h
4	**Others** (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

Morphologic studies of plants, include structure and varieties in roots, stems, leaves, flowers, fruits and seeds in dicotyledonous and monocotyledonous plant species. Anatomic studies of plant organs, tissues in roots, stems and leaves at monocotyledonous and dicotyledonous plants.

2. **Course Main Objective**

The student will be able to:

- Become familiar with basic plant morphology and anatomy.
- Identify plants using morphological characteristics.
- Differentiate between the morphology of root and shoot systems.
- Understand modifications of roots, stems, and leaves.
- Learn the differences between meristematic and permanent tissue.
- Learn the differences between the anatomy of leaves, stems, and roots.
- Predict the optimum conditions for seed germination.
- Interpret the data obtained from any modifications that occur and give the reasons for this.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize knowledge of the different parts of the plant: root, stem, leaf, fruit, and seed.	K1
1.2	Develop core knowledge of plant tissues and their applications to identify the anatomic structure of monocotyledonous and dicotyledonous root, stem, and leaf	K1
1.3	Distinguish the differences between meristematic and permanent tissues	K1
2	**Skills :**	
2.1	Microscopic examination to differentiate between different plant parts in monocotyledonous and dicotyledonous species.	S1
2.2	To perform effective communication and positive relation with others and work as an influential member of a team.	S5
2.3	To recognize the factors affecting seed germination and different types of germination.	S3
3	**Values:**	
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.	V1
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.	V3
3.3	Evaluate the updated laboratory information from different scientific sources.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Seed and seed germination	2
2	Morphological of the root, function, root, and modification	2
3	Morphological structure of stem, function, and metamorphosis of the stem	2
4	Morphological structure of leaf function and metamorphosis of the leaf	2
5	The fruits	2
6	Mid–term exam	2
7	Introduction to plant anatomy: plant cells and tissues (simple complexes and secretory tissues), classification of meristems and permanent tissues.	4
8	Anatomy of Monocot and Dicot Root	2
9	Anatomy of Monocot and Dicot Stem	2

10	Anatomy of Monocot and Dicot leaf	2
	List of Topics (Lab)	
1	Seed and seed germination. Examples for types of germination	2
2	Morphological structures of root, types, and modification	2
3	Morphological structures of stem, types, and modification.Buds and types	2
4	Morphological structures of leaves and modification	2
5	The fruits	2
6	Permeant and meristematic tissues	2
7	Type of vascular bundle	2
8	Anatomy of monocot and dicot Root	2
9	Anatomy of monocot and dicot stem	2
10	Anatomy of monocot and dicot leaves	2
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize knowledge in a different part of the plant: root, stem, leaf, fruit, and seed.	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class and applying this information in the laboratory). -Handout of lecture notes for each topic	• Homework and Quizzes. • Midterm and final written exams (theoretical and practical) • Evaluation of reports • Oral presentation • Course work reports
1.2	Develop core knowledge of plant tissues and their applications to identify the anatomic structure of monocotyledonous and dicotyledonous root, stem, and leaf		
1.3	Distinguish the differences between meristematic and permanent tissues		
2.0	**Skills**		
2.1	Microscopic examination to differentiate between different plant parts in monocotyledonous and dicotyledonous species.	• Application of essential scientific techniques through lectures, classes and essays. • Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). • Homework assignments • Use of microscopic illustrations. • Laboratory training.	-Evaluation of the topics prepared by students. -Midterm and final exams -Checking the homework assignments
2.2	To perform effective communication and positive relation with others and work as an influential member of a team.		
2.3	To recognize the factors affecting seed germination and different types of germination.		
3.0	**Values**		
3.1	Analyze and evaluate time management, discipline, and also to ethical		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	behavioral, respect from different points of view.		• Assignments (Individual and group) • Presentation (Individual and group) assessments. • Research search assignments
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.		
3.3	Evaluate the updated laboratory information from different scientific sources.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam	5th	20
3	Mid-term Practical	5th	10
4	Final Practical Exam	10th	20
5	Final Exam (written test)	11th	40

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.
- Laboratory assistance.
- E-mail communications.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Laboratory equipment. • Library.
Technology Resources (AV, data show, Smart Board, software, etc.)	•Computers and internet connection. • Active Board Data show is required in every room

Item	Resources
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	•Well-equipped laboratory with dissecting microscopes and stereo microscopes. - Permanent slides - Slides and covers - Fresh specimens - Preserved specimens Chemical reagents

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical and practical parts of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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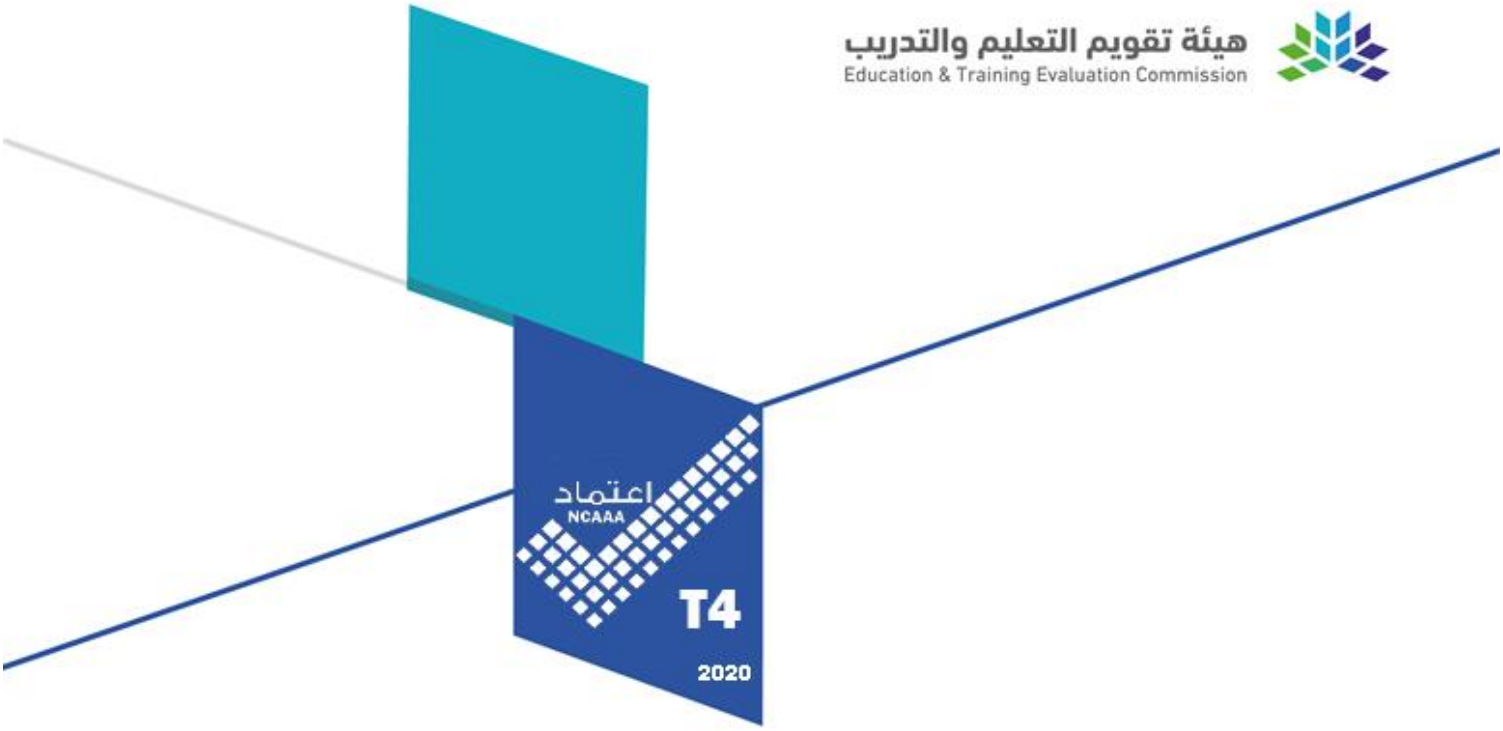
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Principles in Ecology**
Course Code:	**2hrs/ Week (2Lec.)**
Program:	**Environmental Science**
Department:	**Biology Department**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **2h.**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Fourth level, Second year
4. Pre-requisites for this course (if any)**: Natural environments in Saudi Arabia**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**80%**
2	**Blended**		
3	**E-learning**		**20%**
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	10 h. field trip
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course aims to provide an overview of ecology from the level of individual organisms to populations, communities, ecosystems, and the biosphere. It examines ecological interactions' physical, chemical, and biological components and includes terrestrial and aquatic ecosystems. Also, this course introduces the students to the concept of ecology, components, and the relationships within the ecosystem. Also, Plant vegetation, types, and development

2. **Course Main Objective**

The student will be able to:

- Taught the students to acquire specialized knowledge of what is Ecology? How living and non-living things affect each other in their environment.
- Describe the ecosystem's functional structure.
- Illustrate energy in an ecological ecosystem.
- Illustrate the biochemical cycles.
- Illustrate the meaning of plant vegetation, types, and development.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize knowledge and basic information about ecological factors and the relationships between organisms and the environment. Understanding the concept of ecology and its levels.	K1
1.2	Identifying the meaning of ecosystem and recognizing its components, and describe the different biogeochemical cycles	K1
1.3	Illustrate the importance of plant vegetation.	K1
2	**Skills :**	
2.1	Explain the different factors affecting the organism in the environment.	S1
2.2	Differentiate between food chain and food web.	S1
2.3	Summarize major quantitative and qualitative characteristics of the plant community.	S1
2.4	Predict the components in the grassland ecosystem.	S1
3	**Values:**	
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.	V1
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.	V2
3.3	Perform effective communication and positive relation with others and work as an influential team member. .	V3

C. Course Content

No	List of Topics	Contact Hours
1	General introduction of the meaning of ecology and importance. The levels of ecology. Factors affecting the organisms in their environment. The climatic factor is precipitation – temperature, light – humidity- wind, and evaporation. Physiographic factor	6
2	Biological factor, plant-plant relationship- plant-animal relationship Inter-relations of Living Organisms (Mutualism, Commensalism, Parasitism) Plant vegetation, types of plant vegetation, plant vegetation development	2
3	Vegetation sampling using quadrat and transect methods	4
4	Midterm exam	2
5	Major quantitative and qualitative characters of plant community	2
6	Structure of the ecosystem	2
7	Energy in ecological systems- Biogeochemical cycles	2
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize knowledge and basic information about ecological factors and the relationships between organisms and the environment. Understanding the concept of ecology and its levels.	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class. -Handout of lecture notes for each topic . -Small group discussions.	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports • Oral presentation
1.2	Identifying the meaning of ecosystem and recognizing its components, and describe the different biogeochemical cycles		
1.3	Defining the importance of plant vegetation.		
2.0	**Skills**		
2.1	• Explain the different factors affecting the organism in the environment.	• Application of essential scientific techniques through lectures and essays. • Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). • Homework assignments • Field trip	-Evaluation of the topics prepared by students. -Midterm and final exams -Checking the homework assignments
2.2	• Differentiate between food chain and food web.		
2.3	• Summarize major quantitative and qualitative characteristics of the plant community.		
2.4	• Predict the components in the grassland ecosystem.		
3.0	**Values**		
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.		• Assignments (Individual and group) • Presentation (Individual and group) assessments. • Research search assignments
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam I	5th	20
3	Mid-term Exam II	9th	20
4	Final Exam (written test)	11th	50
5			

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.

- Laboratory assistance.
- E-mail communications.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- Beeby & Brennan: First Ecology - Ecological Principles and Environmental Issues 3rd edition - Begon, M. et al (1996 and many subsequent editions) Ecology. Blackwells, Oxford - Krebs, C. (2008, or earlier editions). Ecology: The Experimental Analysis of Distribution and Publisher: Benjamin Cummings
Essential References Materials	
Electronic Materials	https://uoh.blackboard.com • www.google.com • http://herbiers.univ-bpclermont.fr/ • http://www.cabi.org/ http://plantdiversityofsaudiarabia.info/
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Library.
Technology Resources (AV, data show, Smart Board, software, etc.)	•Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template

Evaluation Areas/Issues	Evaluators	Evaluation Methods
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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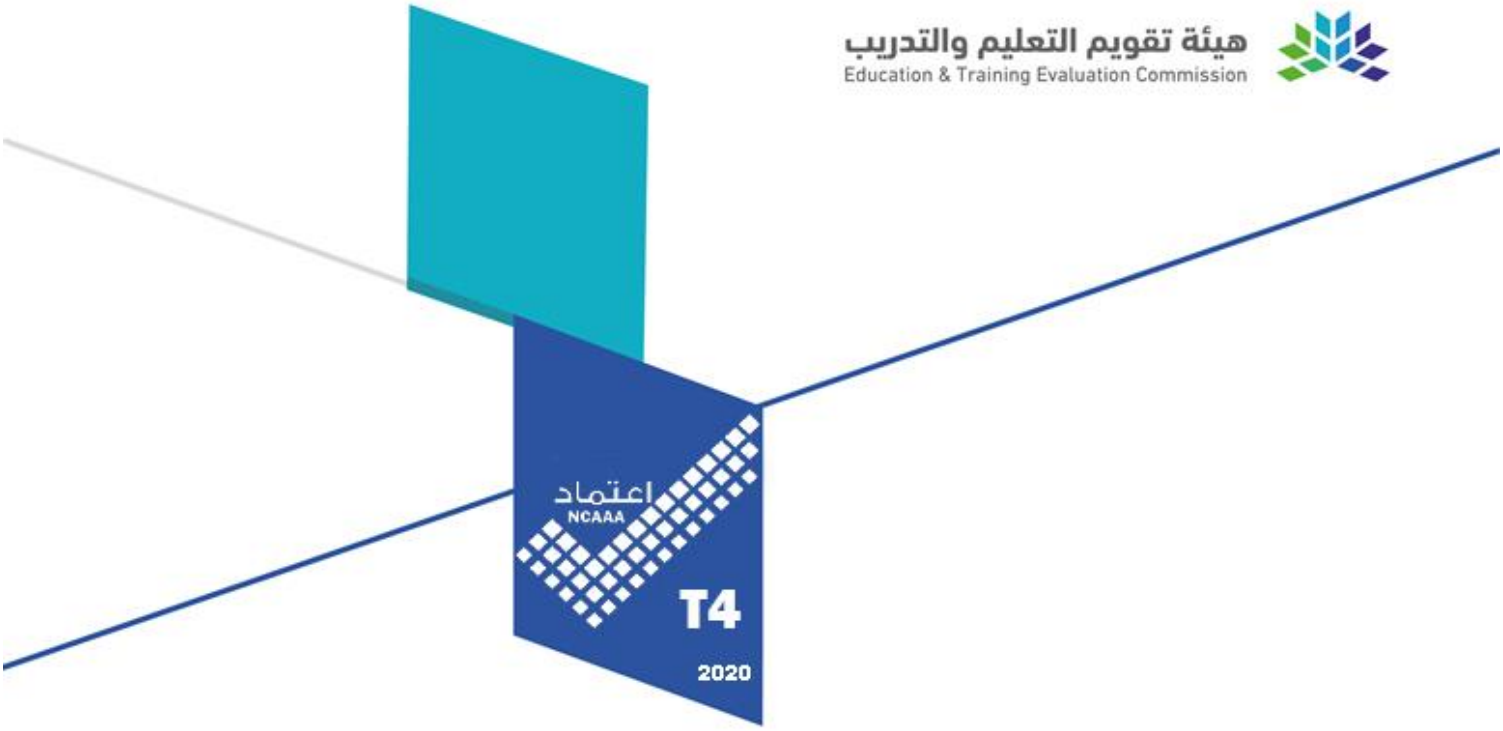
Education & Training Evaluation Commission



Course Specifications

Course Title:	Principles of Analytical Chemistry
Course Code:	
Program:	Environmental science
Department:	Chemistry
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours: 2(1 theoretical + 1 practical)
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: Second level /First year
4. Pre-requisites for this course (if any)**: General Chemistry**
5. Co-requisites for this course (if any)**:---**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**		-
3	**E-learning**		-
4	**Distance learning**		-
5	**Other**		-

7. Actual learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	10
2	**Laboratory/Studio**	27
3	**Tutorial**	
4	**Others** (specify)	6
	Total	43

B. Course Objectives and Learning Outcomes

1. Course Description

The course provides students with the necessary background of qualitative analysis of different compounds and its application.

2. Course Main Objective

By the end of this course student will be able to know the fundamentals of analytical chemistry and has the ability to identify different methods used for qualitative analysis.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Recognize classification and application of qualitative analysis (ionic and	K1

CLOs		Aligned PLOs
	nonionic, electrolytic and non-electrolytic compounds)	
1.2	Describe the factors affecting on the solubility, precipitation	K1
1.3	Explain methods to express concentration and the importance of complex formation.	K2
2	**Skills:**	
2.1	Develop the reverse thinking skills and student gains the practical skills to choose the suitable methods for aqueous solutions solubility and redox processes	S2
2.2	Select the suitable method for expressing concentrations and predict conditions of ideal precipitation	S3
3	**Values:**	
3.2	Work effectively both in a team, and independently on solving chemistry problems.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Analytical chemistry: introduction, types and importance.	1
2	Qualitative chemical analysis	1
3	Solutions, concentrations and the solutions preparation	1
4	Acid and base equilibrium, dissociation of water and indicator	1
5	Hydrolysis of salts, acids and weak base	1
6	Buffer solutions, preparation and importance	1
7	The precipitates and law of solubility product	1
8	The precipitates and solubility products	1
9	The factors effecting on the solubility of precipitates and separations of ionic groups.	1
10	Sample preparation for environmental analysis	1
Total		10

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Recognize classification and application of qualitative analysis (ionic and nonionic, electrolytic and non-electrolytic compounds)	• Lectures. • Lab work.	• Quiz. • Final and mid-term exam. • Lab exam
1.2	Describe the factors affecting on the solubility, precipitation	• Lectures	• Quiz. • Final and mid-term exam.
1.3	Explain methods to express concentration and Identify chemical, kinetic equilibrium, acid base equilibrium and the importance of complex formation.	• Lectures. • Lab work.	• Quiz. • Final and mid-term exam. • Lab exam
2.0	**Skills**		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	Develop the reverse think skills and student gains the practical skills to choose the suitable methods for aqueous solutions solubility and redox processes	• Lectures	• Exams
2.2	Select the suitable method for expressing concentrations and predict conditions of ideal precipitation	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab. Work.
3.0	**Competence**		
3.2	Work effectively both in a team, and independently on solving chemistry problems.	• Lab work • Library visit.	• Quiz. • Lab report

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	--	10 %
2	Midterm Exam.	5	20 %
3	Practical Exam.	11	30 %
4	Final Exam. (2hours Exam)	12	40 %
5	Total		100 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- We have faculty members to provide counselling and academic advice.
- 2 hours per week as office hours are available for discussion with the students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch. ***Fundamentals of analytical chemistry***, 9th edition , Brooks Cole (2014) • Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, ***Analytical Chemistry***, 7th edition, WILEY (2014).
Essential References Materials	• Lecture Hand outs available on the coordinator website
Electronic Materials	• http://www.chemhelper.com/ • http://www.chemweb.com/ • http://www.science.uwaterloo.ca/~cchieh/cact/ http://www.sciencedirect.com/
Other Learning Materials	• Microsoft Power Point and Microsoft Word • Qualitative analysis video • Teaching CD for qualitative analysis

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classrooms capacity (30) students. • Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	Room equipped with computer and projector and TV
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	No other requirements.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty Indirect (feedback from faculty and students).
Quality of learning resources	Students	Direct (feedback from faculty). Indirect (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	02 – 04 - 2022

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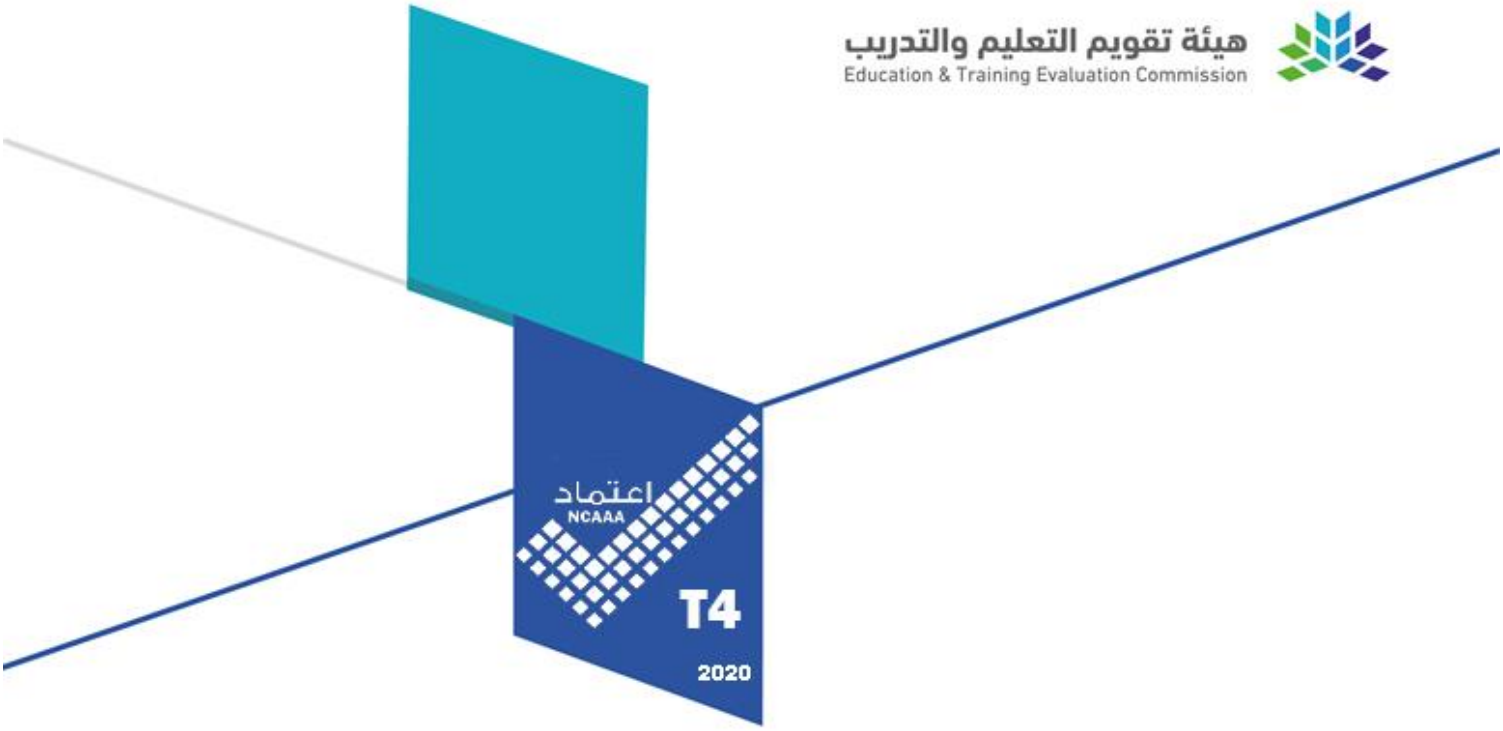
Education & Training Evaluation Commission



Course Specifications

Course Title:	Quantitative analysis
Course Code:	
Program:	Environmental science
Department:	Chemistry
College:	Faculty of Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:	**3hrs** (2 theoretical + 1 practical)
2. Course type	
a.	University ☐ College ☐ Department ■ Others ☐
b.	Required ■ Elective ☐
3. Level/year at which this course is offered:	**4th level / 2rd year**
4. Pre-requisites for this course (if any)**: Principles of analytical chemistry**	
5. Co-requisites for this course (if any)**:**	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	27
3	**Tutorial**	-
4	**Others** (specify)	6
	Total	53

B. Course Objectives and Learning Outcomes

1. Course Description

The course provides students with the necessary background of quantitative analysis of different compounds using different tools of analysis and its application.

2. Course Main Objective

By the end of this course, the student should be aware of:

1. Describe the theoretical principles of quantitative analysis.
2. Familiar with statistical methods and solution concentration parameters in chemical measurements.
3. Apply the procedures required for gravimetric analysis and factors which effect the precipitation process.
4. Know difference between co-precipitation and post-precipitation, weighted form and precipitate form as well as the role of different precipitants.

3. Course Learning Outcomes

CLOs	Aligned PLOs

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize the principles and requirements of different types of volumetric and gravimetric analysis in analytical chemistry.	K1
1.2	Describe different types of volumetric titrations (neutralization, precipitation - reduction-oxidation - complexometric).	K2
1.3	Identify the suitable condition of gravimetric analysis, precipitants types and its applications in removal of contamination.	K2
2	**Skills :**	
2.1	Apply the suitable Volumetric methods to determine the concentration of the analyte.	S3
2.2	Explain the specific steps of gravimetric analysis.	S1
2.3	Practice Volumetric and Gravimetric methods to identify the concentration of different types of analytes	S3
3	**Values:**	
3.1	Communicate effectively with lecturer and colleagues on solving analytical chemical problems.	V2
3.2	Work effectively both in a team, and independently to perform a specific experiment.	V3

C. Course Content

No	List of Topics	Contact Hours
1	Introduction + the basic terms used in analytical chemistry + ways of expressing concentrations.	2
2	Acid-base titration, principles, calculations and applications	2
3	Precipitation titration, principles, calculations and applications	2
4	Redox titration, principles, calculations and applications	2
5	Complexometric titration, principles, calculations and applications	2
6	Principles and requirements of gravimetric analysis.	2
7	Gravimetric analysis: principles, types and importance.	2
8	The sample preparation and the use of quantitative analysis for environmental purposes; particularly food and soil.	4
Total		**20**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize the principles and requirements of different types of volumetric and gravimetric analysis in analytical chemistry.	Lectures	Exams
1.2	Describe different types of volumetric titrations (neutralization, precipitation, reduction-oxidation, complexiometric).	Lectures	Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Identify the suitable condition of gravimetric analysis, precipitants types and its applications in removal of contamination.	Lectures	Exams
2.0	**Skills**		
2.1	Apply the suitable Volumetric methods to determine the concentration of the analyte.	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab exam.
2.2	Explain the specific steps of gravimetric analysis.	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab exam.
2.3	Practice Volumetric and Gravimetric methods to identify the concentration of different types of analytes	• Lectures • Lab work	• Quiz. • Final and mid-term exam. • Lab exam.
3.0	**Values**		
3.1	Communicate effectively with lecturer and colleagues on solving analytical chemical problems.	• Lab work Library visit.	• Quiz. • Lab report
3.2	Work effectively both in a team, and independently to perform a specific experiment.	• Lab work Library visit.	Assignments and activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities	----	10%
2	Midterm exam	6	20%
3	Practical exam	11	30%
4	Final exam	12	40%
Total			**100%**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- We have faculty members to provide counselling and academic advice.
- 2 hours per week as office hours are available for discussion with the students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, ***Analytical Chemistry***, 7th edition, Springer (2014)
Essential References Materials	Lecture handouts available on the coordinator website.
Electronic Materials	• **http://www.chemweb.com** • **http://www.sciencedirect.com** • **http://www.rsc.org**
Other Learning Materials	Not required

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classroom capacity (30) students. • Providing hall of teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	Room equipped with computer and projector and TV.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	No other requirements.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	Direct (60% of the students achieved ≥ 70% of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty Indirect (feedback from faculty and students).
Quality of learning resources	Students	Direct (feedback from faculty). Indirect (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	Direct (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	02 – 04 – 2022

Course Title:	Radiation Physics
Course Code:	
Program:	BSc. Environmental Sciences
Department:	Biology
College:	science
Institution:	Umm Al-Qura University

Table of Contents

. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 6/2
4. Pre-requisites for this course (if any)**:** Environmental Physics
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30	%100
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description The course covers the principles of radiation physics related to environment and provides a conceptual and background in radiation physics sufficient to enable students to make proper assessment of radiation hazards in the environment.
2. Course Main Objective To provide the technical background needed to proper understanding of radioactivity and radioactive materials, quantitative risk assessment for radiation hazards in the environment.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Demonstrate the fundamentals and basic concepts of Environmental Radioactivity: Radiation and Radioactivity, Interaction of radiation with matter, Radiation biology and health effects	K1
2	**Skills:**	
2.1	To know how to assess, evaluate, or calculate the following: Radiation Measurements, Environmental Dispersion, Radiation Quantities and Dosimetry Calculations, and Radiation Safety Measures	S1 S4
2.2	Effectively communicates physics concepts, processes, and results, both orally and in writing related Environmental Radiation Protection	S5
3	**Values:**	
3.1	Works responsibly and effectively within the work team to practice and interact with the safety culture related Radiation Protection Standards and Regulations, Radiation-Protection Criteria and Exposure Limits, and Environmental Protection	V1,V3

C. Course Content

No	List of Topics	Contact Hours
1	Review of Physical Principles	2
2	Atomic and Nuclear Structure	3
3	Radioactivity and Radiation Sources	3
4	Interaction of Radiation with Matter	2
5	Radiation biology and health effects	3
6	Radiation Detection	2
7	Radiation Quantities and Dosimetry Calculations	3
8	Nuclear Fission and power production	3
9	Environmental Radioactivity	2
10	Environmental Dispersion	3
11	Radiation Protection Standards and Regulations	2
12	Environmental Protection	2
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1	**Knowledge and Understanding:** of the following topics		
1.1	Demonstrate the fundamentals and basic concepts of Environmental	1. Lecturing	a) Midterm exam. b) Final exam.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	Radioactivity: Radiation and Radioactivity, Interaction of radiation with matter, Radiation biology and health effects and Nuclear Fission and power production	2. Starting with the topic outlines. 3. Demonstrate the basic principles. 4. Solve problem 5. Brain storming	c) Homework. d) Oral Questions.
2.0	**Skills:** to know how to assess, evaluate, or calculate the following:		
2.1	to know how to assess, evaluate, or calculate the following: Radiation Measurements, Environmental Dispersion, Radiation Quantities and Dosimetry Calculations, and Radiation Safety Measures	Lecturing, discussion, and problem-solving.	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions. f) Group output
2.2	Effectively communicates physics concepts, processes, and results, both orally and in writing related Environmental Radiation Protection		
3	**Values:** to practice and interact the safety culture related to:		
3.1	Works responsibly and effectively within the work team to practice and interact with the safety culture related Radiation Protection Standards and Regulations, Radiation-Protection Criteria and Exposure Limits, and Environmental Protection	1. Presentations 2. Scientific reports and team projects.	Reports and presentations evaluation.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Weekly quizzes	Through term	10
2	Homework	Through term	10
3	Midterm exam	6	30
4	Final Exam	12	50

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
Consultation and/or academic advice will be available during the teaching staff office hours

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1. Herman Cember, and Thomas E. Johnson, PhD Introduction to Health Physics. 4th edition. 2009. The McGraw-Hill Companies, Inc. 2. Eisenbud,M. and Gesell,M., "Enviromental Radioactivity",4th edition, Academic Press, London, 1997.
Essential References Materials	1. James E. Martin. Physics for Radiation Protection. 2013. Wiley-VCH Verlag & Co. 2. James E. Turner. Atoms, Radiation, and Radiation Protection. 3rd Edition. 2007. WILEY-VCH Verlag GmbH & Co. 3. Daniel A. Gollnick BASIC RADIATION PROTECTION TECHNOLOGY. 6th Edition. 2018. Pacific Radiation
Electronic Materials	IAEA Publications IAEA Training Courses ICRP Publications EPA Publications
Other Learning Materials	http://www.lnhb.fr/nuclear-data/nuclear-data-table/ https://www.nrc.gov/reading-rm/basic-ref/students/for-educators.html

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Traditional Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NA

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course content	Instructor, students	Questionnaire, Course report
Course importance	Students, Program administrator	Questionnaire, Course report
Course – Program relation	Program administrator, Peer Reviewer	Questionnaire, Course report
Extent of achievement CLOs	Instructor, students	Questionnaire, Course report
Effectiveness of teaching Strategies	Students, Program administrator	Questionnaire
Effectiveness of student assessment	Instructor , Students, Program administrator	Exams, Questionnaire
Quality of learning resources	Instructor, Peer Reviewer	Course report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Renewable Bioenergy**
Course Code:	
Program:	**BSc Environmental science**
Department:	**Department of Biology**
College:	**Faculty of Science – Department of Biology**
Institution:	**UMM AL – QURA UNIVERSITY**

Table of Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: Level 8, third year
4. Pre-requisites for this course (if any)**:** Fundamentals of Microbiology
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	20	
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**	30	

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	30
3	**Tutorial**	
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers alternative, renewable bioenergy derived from biological sources and their applications.

The topics to be covered include bioenergy and biofuel as a sustainable clean energy source, biofuel generations, microbial bioenergy, bioreactors for biofuel production, biohydrogen, biogas, biodiesel, bio-alcohol, biomass, and bioelectricity this will include the microorganisms used in bioenergy and biofuels production, microbial fuel cell, and photo microbial fuel cell design.

2. Course Main Objective

- To understand the Global and local importance of renewable bioenergy, (sustainable and environmentally friendly clean energy source).
- To be familiarized with different types of renewable biofuels (solid, liquid, gas).
- To be familiarized with different types of microbes associated with renewable bioenergy.
- Understand role of microbes in producing renewable bioenergy and biofuel.
- Lab scale production of bioenergy and biofuel using conventional bioreactor, digester, and fuel cell.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
	1- Understand the environmental and economical importance of renewable bioenergy. 2-Fundamental understanding of bioenergy production. 3-Ability to describe biochemical processes of biomass conversion to bioenergy production. 4-Understanding of technical operation conditions of bioreactors 5-Understanding of the fundamentals of various pretreatment technologies.	
2	**Skills :**	
	1- The ability to collect environmental inoculum for biogas production using the indications of the soil's color, depth, and smell. 2- The ability to produce biofuel using a conventional bioreactor, digester, and fuel cell. 3- Perform the laboratory experiments precisely. 4- Communicating personal ideas about the possible application of biofuel in The Kingdom of Saudi Arabia (national Saudi vision 2030 ex. the Red Sea and Neom projects)	
3	**Values:**	
	- Enhancing national values and creative thinking among students using what they learn during the course to find solutions and applications that serve some local and national needs. - The ability to work independently and as part of team. - Demonstrate professional attitudes and behaviors towards others. - Propose the smart questions related to the course topics.	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Bioenergy: Introduction, Global and local economic and environmental importance of bioenergy, biofuel as a sustainable clean fuel.	1 week (2 hrs)
2	Bioenergy and Biofuel terminologies, Bioenergy types (solid, liquid, and gas forms), biofuel generations, microbial bioenergy and biofuel, (Biodiesel, Bioethanol,Biomethane/Biogas, Biohydrogen etc,), bioreactors for biofuel production.	2 week (4 hrs)
3	Biological solid fuel and biomass	1 week (2 hrs)
4	Gaseous biofuel (Biohydrogen and Biomethane)	2 week (4 hrs)
5	Liquid biofuels (biodiesel, bio-alcohol).	2 weeks (4 hrs)
6	Bioelectricity, microbial fuel cell, and photo microbial fuel cell.	2 week (4 hrs)
Total		20 hrs

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
	1-Understand the environmental and economical importance of biofuel as a clean and renewable energy source. 2-Fundamental understanding of bioenergy production (energy security, and other environmental saving, commercial, transportations and industrial use of biofuel). 3-Ability to describe biochemical processes of biomass conversion to bioenergy production. 4-Understanding of technical operation conditions of bioreactors. 5-Understanding of the fundamentals of various pretreatment technologies.	*Lectures (Presentations). *Discussions. *Brainstorming. *The use of educational techniques (Video tutorial). *Local algae sampling activity.	-Oral Discussions. -Exams (Mid and Final). -Reports and essay
2.0	**Skills**		
	1- The ability to collect environmental inoculum for biogas production using the indications of the soil's color, depth, and smell. 2- The ability to produce biofuel using a conventional bioreactor, digester, and fuel cell. 3- Perform the laboratory experiments precisely. 4- Communicating personal ideas about the possible application of biofuel in The Kingdom of Saudi Arabia (national Saudi vision 2030 ex. the Red Sea and Neom projects)	-Lab work -Case Study -Active learning -Small group discussion -Homework (Preparing a report on some topics related to the course).	-Quiz, practical exams. (Exams must contain questions that can measure these skills). -Discussions after lectures.
3.0	**Values**		
	- "Enhancing national values and creative thinking among student to think of solutions for some local and national needs through the use of biofuel". - The ability to work independently and as part of team. - Demonstrate professional attitudes and behaviors towards others. - Propose the smart questions related to the course topics.	-Active learning -Small group discussion. -carryout the experiments in the lab.	-Evaluate the work in team. -Evaluation of the role of each student in lab group assignment.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodical Exam(s)	4	5%
2	Mid Term Exam (Theoretic)	6	20%
3	Mid Term Exam (practical)	6	10%
4	Reports and essay	11	10%
5	Final Practical Exam	12	15%
6	Final Exam	13	40%
7			
8	Total		100%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- In pre-determined office hours.
- By appointment on per need basis.
- E-communication through email or the university site (E-learning).

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Love, J., & Bryant, J. A. (2017). *Biofuels and bioenergy*. Wiley Blackwell. Rutz, Dominik, and Janssen, Rainer. (2008). Biofuel technology handbook. (2nd. Ed). WIP Press. Germany.
Essential References Materials	Books and scientific papers related to the topics
Electronic Materials	
Other Learning Materials	PPT prepared by Dr. Ahmad A Alsaigh

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Classroom is provided with a data show and whiteboard. - The area of the classroom is suitable concerning the number of enrolled students and air-conditioned. - The laboratory is provided with the tools, devices, and materials needed for the main experiments.
Technology Resources (AV, data show, Smart Board, software, etc.)	- Data show, and digital lab containing 15 computers.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	- Incubators, autoclaves, measuring equipment, water bath, digital balances, pH meters, safety facilities. - Different media - All chemicals and reagents that needed for microalgae culturing and experiments.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

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

H. Specification Approval Data

Council / Committee	Biology department / Dr. Ahmad Abdulhadi S Alsaigh
Reference No.	
Date	26/03/2022

Course Title:	Renewable Energy Resource
Course Code:	
Program:	BSc. Environmental Sciences
Department:	Biology
College:	Science
Institution:	Umm Al-Qura University

Table of Contents

A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level 7/3rd year
4. Pre-requisites for this course (if any)**:** Environmental Physics
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

The main purpose of this course is to introduce students with renewable energy resources potential and availability as a substitute for conventional energy resources in future energy demand.

2. Course Main Objective

This course discusses the world's present needs of energy and future demands, as well as the limitations and issues of natural resources. This course gives an overview of the main scientific principles and technologies related to harnessing and conversion of the renewable energy resources, including solar, wind, hydroelectric, geothermal. Also, energy storge technology is covered in this course.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Discuss the advantage and disadvantage of conventional and renewable energy.	K1
1.2	Demonstrate the principles of renewable energies and its application.	K1
1.3	Differentiate between different types of renewable energies.	K1
2	**Skills :**	
2.1	Evaluate the physical quantity using the laws of physics in the field of renewable energy.	S1
3	**Values:**	
3.1	Works responsibly and effectively within the work team.	V3
3.2	Effectively communicates physics concepts, processes, and results, both orally and in writing.	V4

C. Course Content

No	List of Topics	Contact Hours
1	Course Introduction (Energy Sources and Environmental Effects) A brief history of energy consumption: Global energy needs Energy consumption and greenhouse gas emission Energy consumption and weather risk	3
2	Basic physics of energy: Non-renewable and renewable sources of energy Converting Primary Energy into Useful Energy Energy Units Fossil Fuels Natural Gas Coal Nuclear Energy	3
3	Solar energy History of Solar Energy Solar Resource Solar Thermal Systems	6
4	Wind energy Basic physics of wind power Types of Wind Turbines Environmental Impacts of Wind Turbines	6
5	Hydropower Hydropower resources Hydropower technologies Environmental impact of hydro power sources.	3
6	Geothermal energy Geothermal Resources Geothermal Technologies	3
7	Other form of renewable energy Wave Energy Tidal Energy Energy from Currents Hydrogen fuel	3
8	Energy storge Energy Storage types	3
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Discuss the advantage and disadvantage of conventional and renewable energy.	1. Lecture method: Board and PowerPoint. 2. Begin the lecture with a brief idea of the topic. 3. Demonstrate the basic principles. 4. Discussing phenomena with illustrating pictures and diagrams. 5. Solve problem 6. Brain storming	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
1.2	Demonstrate the principles of renewable energies and its application.		
1.3	Differentiate between different types of renewable energies.		
2.0	**Skills**		
2.1	Evaluate the physical quantity using the laws of physics in the field of renewable energy.	1. Lecture method: Board and PowerPoint. 2. Begin the lecture with a brief idea of the topic. 3. Demonstrate the basic principles. 4. Discussing phenomena with illustrating pictures and diagrams. 5. Solve problem 6. Brain storming	a) Midterm exam. b) Final exam. c) Homework. d) Oral Questions.
3.0	**Values**		
3.1	Works responsibly and effectively within the teamwork.	1. Give students tasks of duties as a teamwork. 2. Asking the teamwork to write scientific reports or project. 3. Asking the teamwork to demonstrate the results of the scientific reports or project.	a) Scientific discussion b) Teamwork
3.2	Effectively communicates physics concepts, processes, and results, both orally and in writing.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Weekly quizzes	Through term	10
2	Homework	Through term	10
3	Midterm exam	6	30
4	Final Exam	12	50

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Consultation and/or academic advice will be available during the teaching staff office hours

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1. Energy for a sustainable world: from the oil age to a sun-powered future by Balzani, Vincenzo and Armaroli, Nicola. Publisher : Wiley-VCH; 1st edition (September 7, 2011)
Essential References Materials	1. Renewable Energy Resources by John Twidell. Publisher: Routledge; 4th edition (November 24, 2021)
Electronic Materials	https://www.energy.gov/eere/office-energy-efficiency-renewable-energy https://aip.scitation.org/journal/rse
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms for at least 40 students, and library

Item	Resources
Technology Resources (AV, data show, Smart Board, software, etc.)	Data Show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching Strategies	Students	Questionnaire
Effectiveness of student assessment	Instructor	Exams
Extent of achievement of course learning outcomes	Instructor	Course report
Quality of learning resources	Instructor	Course report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Sampling and analysis of environmental contamination**
Course Code:	
Program:	**BSc Environmental Sciences**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura university**

Table of Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: Level 4 / 2 nd Year
4. Pre-requisites for this course (if any)**:** **Fundamentals of Microbiology**
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course is intended to present advanced notions in environmental sampling theory and statistical techniques for the analysis of sampled data, to water and environmental scientists to. The course covers such topics as statistical sampling techniques, field sampling design, sample size identification, estimation of the characteristics of the population, identification of hot spots, estimation of spatial patterns, statistical tests, and prediction with data series. Several real-world case studies are also presented.

2. Course Main Objective

After completing the course, the student should be able to:

- Select the appropriate statistical sampling method for the problem in hand and plan a sampling campaign.
- Identify the sample size that allows meeting the estimation needs and analyze the sampled data.
- Identify whether highly contaminated local areas (hot spots) are present and locate them properly.
- Define confidence interval bounds for any statistical sampling scheme.
- Use several statistical methods for the analysis of the sampled data and make inference concerning the population.
- Develop mathematical equations for the sample size and characteristics of the population with any new mathematical sampling technique.
- Carry out a full frequency analysis with sampled data.
- Address several more advanced mathematical issues such as non-stationarity in data, spatial modeling and resampling techniques.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Demonstrate appropriate depth and breadth of knowledge that is at the frontier of their disciplines.	
1.2	Use skills of interdisciplinary scholarship and research to integrate multiple perspectives.	
1.3	Work effectively in a multidisciplinary collaborative environment using highly developed cognitive and creative expert skills and intellectual independence.	
1.4	Communicate effectively, in written and oral forms, their research results and/or critique highly complex and diverse matters to diverse audiences.	
1.5	Use self-development for personal and professional improvement in their field and contribute to its future advancement.	
2	**Skills:**	
2.1	• Critical Thinking: Gather, analyze, synthesize, evaluate, and apply information. • Interpersonal: Interact collaboratively to achieve common goals • Quantitative and Empirical Reasoning: Apply mathematical, logical and scientific principles and methods. • Technology: Use appropriate technology to retrieve, manage, analyze, and present information.	
2.2	**Interpersonal Skills and Responsibility:** At the end of the course, the student will be able to: - Be involved in self-directed learning. - Succeed in team Works. - Share and discuss results with others. - Be involved in a simple research project. - Evaluate answers and positively criticize them.	
2.3	**Communication, Information Technology and Numerical Skill**	

CLOs		Aligned PLOs
	The student can propose solutions to some problems**:** - Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	
2.4	**Psychomotor Skills (if applicable)** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	
3	**Values:**	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3.4	- Communicate results of work to others.	

C. Course Content

No	List of Topics	Contact Hours
1	Sampling objectives and principles.	3
2	Preparation of field work / Statistical sampling techniques / Locating Hot Spots.	3
3	Simple random sampling / Ratio estimation and sample size.	3
4	Spatially and auto-correlated data.	3
5	Stratified random sampling.	3
6	***Mid-Term Exam.***	3
7	Further aspects of Stratified random sampling.	3
8	Systematic sampling /Two-Stage sampling/ Double sampling.	3
9	Statistical tests, drawing conclusions from data / Prediction with sampled data.	3
10	Trends, shifts and seasonality / Resampling techniques, spatial patterns in data.	3
11	Design problem presentations.	3
12	***Final Examination.***	3
Total		36

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Demonstrate appropriate depth and breadth of knowledge that is at the frontier of their disciplines.	-Teaching strategies to be used to develop that knowledge. - Lectures -Take home Assignment. - Internet activities. - Laboratory work.	1. Course work reports 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final exams 4. Checking the homework assignments
1.2	Use skills of interdisciplinary scholarship and research to integrate multiple perspectives.		
1.3	Work effectively in a multidisciplinary collaborative environment using highly developed cognitive and creative expert skills and intellectual independence.		
1.4	Communicate effectively, in written and oral forms, their research results and/or critique highly complex and diverse matters to diverse audiences.		
1.5	Use self-development for personal and professional improvement in their field and contribute to its future advancement.		
2.0	**Skills**		
2.1	**Cognitive Skills** • Critical Thinking: Gather, analyze, synthesize, evaluate, and apply information. • Interpersonal: Interact collaboratively to achieve common goals • Quantitative and Empirical Reasoning: Apply mathematical, logical and scientific principles and methods. •Technology: Use appropriate technology to retrieve, manage, analyze, and present information.	- Lectures. - Brain storming. - Discussion. - Seminars. - Self assessment. - Examination of selected micrographs and hand drawings.	1. Course work Reports. 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final Exams. 4. Checking the homework assignments.
2.2	**Interpersonal Skills & Responsibility** - Be involved in self-directed learning. - Succeed in teamwork. - Share and discuss results with	-Lab work. -Case Study. -Active learning. -Small group discussion -Cooperative learning	-Assissent of group assignements. -Evaluate the independent assignements.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	others. -Be involved in simple research project. -Evaluate answers and positively criticize them.	and application of scientific method in thinking the scientific problem solving. -Work as part of a team.	
2.3	**Communication, Information Technology, Numerical** -Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	-Oral presentations. - Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Evaluating the laboratory written reports. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation
2.4	**Psychomotor:** (Description of the psychomotor skills to be developed and the level of performance **required:** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	- Follow up students the students in lab and during carryout all the laboratory experiments	- Evaluating the laboratory written reports. - Evaluating the community participation**.**
3.0	**Values**		
3.1	- Use information and communication technology.	-Oral presentations. -Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements.	-Evaluation of student essays and assignments. -Evaluating the laboratory written reports. -Marks given to for good reports and
3.2	-Use IT and communication technology in gathering and interpreting information and ideas.		
3.3	-Use the internet as a means of communication and a source of information.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		-Students will be asked for delivering a summary regarding certain topics related to the course.	presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam.	6 th week	20 %
2	Activities.	10 th week	10 %
3	Final practical exam.	11 th week	30 %
4	Final theory exam.	12 th week	40 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- Handouts. - Gilbert, R.O. (1987) Statistical Methods for Environmental Pollution Monitoring. John Wiley & Sons, New York. (ISBN 0-471-28878-0). - Cochran, W.G. (1977) Sampling Techniques. John Wiley & Sons, Toronto. (ISBN 0-471-16240-X).
Essential References Materials	- Brockwell, P. J., Davis, R. A. (2005) Introduction to Time Series and Forecasting. Springer Texts in Statistics. - Manly, B.F.J. (2009) Statistics for environmental science and management. Applied Environmental Statistics Series, Chapman & Hall/CRC Press. - Kitanidis, P.K. (1997) Introduction to geostatistics. Cambridge University Press. - Salas, J. D., Delleur, J. W., Yevjevich, V. and Lane, W. L., 1980, Applied Modeling of Hydrologic Time Series, Water Resources Publications, Littleton, Colorado.
Electronic Materials	
Other Learning Materials	- Copies of all necessary material will be provided to the students. - Copies of additional recommended reading textbooks will be ordered at the library.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	**Laboratory:** Computer laboratory might be used for software applications (homework's and design problem).
Technology Resources (AV, data show, Smart Board, software, etc.)	A combination of white board use, hand-outs, PowerPoint slide presentations, and interactive class discussions will be used. Open discussions are favored as they encourage students to participate and exchange and enhance the overall learning process.
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	A site visit may be arranged during the course.

G. Course Quality Evaluation

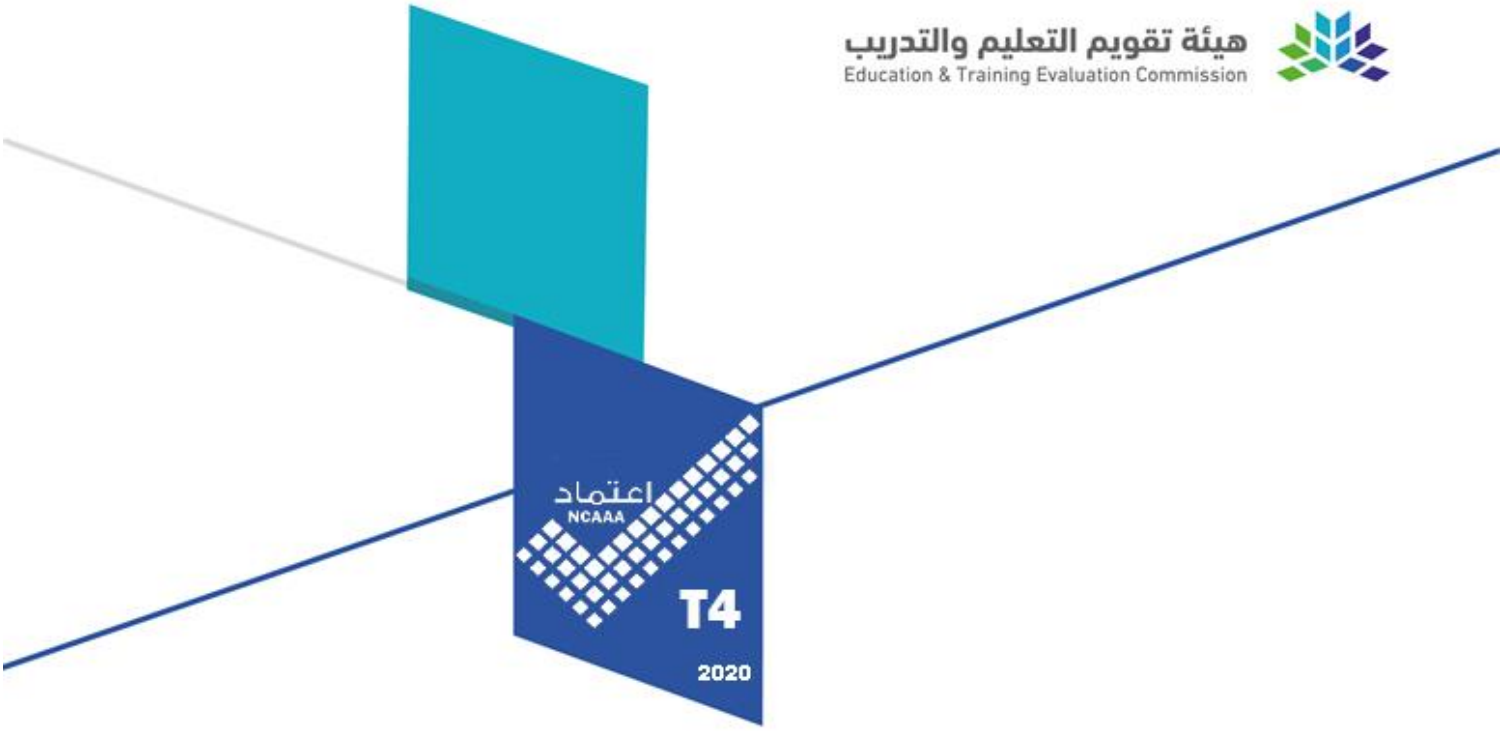
Evaluation Areas/Issues	Evaluators	Evaluation Methods
-Strategies for Obtaining student feedback on Effectiveness of teaching.	-The instructor or by the department.	Distribution of questionnaires for course evaluation by students. Students- faculty meetings.
- Other Strategies for Evaluation of teaching.	- The instructor or by the department.	-Data show is required in every room. -Smart Board departmental plan committee. -Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental studying plan committee.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Soil Science**
Course Code:	**3hrs/ Week (2Lec.+1 lab)**
Program:	**Environmental Science**
Department:	**Biology Department**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **2h.**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Fifth level, Second year
4. Pre-requisites for this course (if any)**: Natural environments in Saudi Arabia**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**70%**
2	**Blended**		
3	**E-learning**		**20%**
4	**Distance learning**		**10%**
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	30
3	**Tutorial**	6
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

An introduction to soils, its components and its relationship to the environment. The importance of soils to animals, and plants. Important physical properties, role of soil constituents; origin, nature, and classification of parent materials; soil genesis, classification, and survey; soil fertility and chemical properties; soils and the world's food supplements

2. **Course Main Objective**

The student will be able to:

- To provide students with the knowledge about soils and their physical, chemical, and biological properties.
- To provide students with the knowledge to understand the relationship of soils to their environment.
- To provide students with the knowledge to recognize the importance of physical properties and the role of soil constituents.
- To provide students with the knowledge to determine the significance of soils' origin, nature, and classification of parent materials.
- To provide students with the knowledge to describe the soil genesis, classification, and survey; soil fertility and chemical properties; and soils and the world's food.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Comprehensive knowledge of rocks and minerals, their composition, and the types of soils formed from different parent materials.	K1
1.2	Understand the role of soil-forming factors and processes in soil formation	K2
1.3	Understand various soil physical, chemical, and biological properties and their impact on plant growth.	K1
2	**Skills :**	
2.1	Explain how soil surveys are prepared and used.	S1
2.2	Name and classify the essential elements in soil and explain how the plants absorb them.	S2
2.3	Describe soil pH, how it develops, and its effects on plant growth.	S1
2.4	Explain what organic matter is, how it forms, and what it does in the soil.	S1
3	**Values:**	
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.	V1
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.	V2
3.3	Perform effective communication and positive relation with others and work as an influential team member.	V1

C. Course Content

No	List of Topics (Lecture)	Contact Hours
1	Soil factor (soil formation, soil Origin, structure), Factors influencing soil formation.	4
2	Soil classification, Soil orders , Categories and nomenclature of soil taxonomy, Soil textural classes	2
3	Soil physical properties, Texture, Structure, Color ,Profiles, Bulk Density Particle density, Pore space, Soil management as applied to physical properties	4
4	Mid- Term Exam	
5	Soil chemical properties	2

6	Diversity of soil organisms, Influence of soil microorganisms, The soil environment and organisms, and organic matter	4
6	soil water	2
7	Major Causes of soil degradation	2
	Lab Topics	
1	Soil Sampling	2
2	Soil Physical Properties: Texture, Aggregation and Structure Characteristics, Temperature, Color Pore Space, Bulk Density, Soil Water Relationships	6
3	Mechanical analysis, moisture content	4
4	Chemical properties of soil: soil solution, pH, Total soluble salt, Soil Organic Matter, Chloride, carbonate, and bicarbonate	6
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Comprehensive knowledge on rocks and minerals, their composition and the types of soils formed from different parent materials.	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class. -Handout of lecture notes for each topic . -Small group discussions.	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports • Oral presentation
1.2	Understand the role of soil forming factors and processes in soil formation		
1.3	Understand various soil physical, chemical and biological properties and their impact on plant growth.		
2.0	**Skills**		
2.1	• Explain how soil surveys are prepared and used.	• Application of essential scientific techniques through lectures and essays. • Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). •Homework assignments	-Evaluation of the topics prepared by students. -Midterm and final exams -Checking the homework assignments
2.2	• Name and classify the essential elementsin soil and explain how they are absorbed by the plants.		
2.3	• Describe soil pH, how it develops, and its effects on plant growth.		
2.4	• Explain what organic matter is, how it forms, and what it does in the soil.		
3.0	**Values**		
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.		• Assignments (Individual and group) • Presentation (Individual and group) assessments. • Research search assignments
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.		
3.3	Perform effective communication and positive relation with others and work as an influential team member.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam I	5th	20
3	Final Exam Lab	11th	20
4	Lab activities	Weekly	10
5	Final Exam (written test)	12th	40

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.
- Laboratory assistance.
- E-mail communications.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Tan, K. (2000): Environmental Soil Science. Marcel Dekker Inc., NY, USA *Kim H .Tan (2009): Environmental Soil Science. Raymond N. Yong, Masashi Nakano, Roland Pusch (2012) :Environmental Soil Properties and Behavior. CRC press
Essential References Materials	
Electronic Materials	https://uoh.blackboard.com • www.google.com • http://herbiers.univ-bpclermont.fr/ • http://www.cabi.org/ http://plantdiversityofsaudiarabia.info/
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Library.
Technology Resources (AV, data show, Smart Board, software, etc.)	•Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

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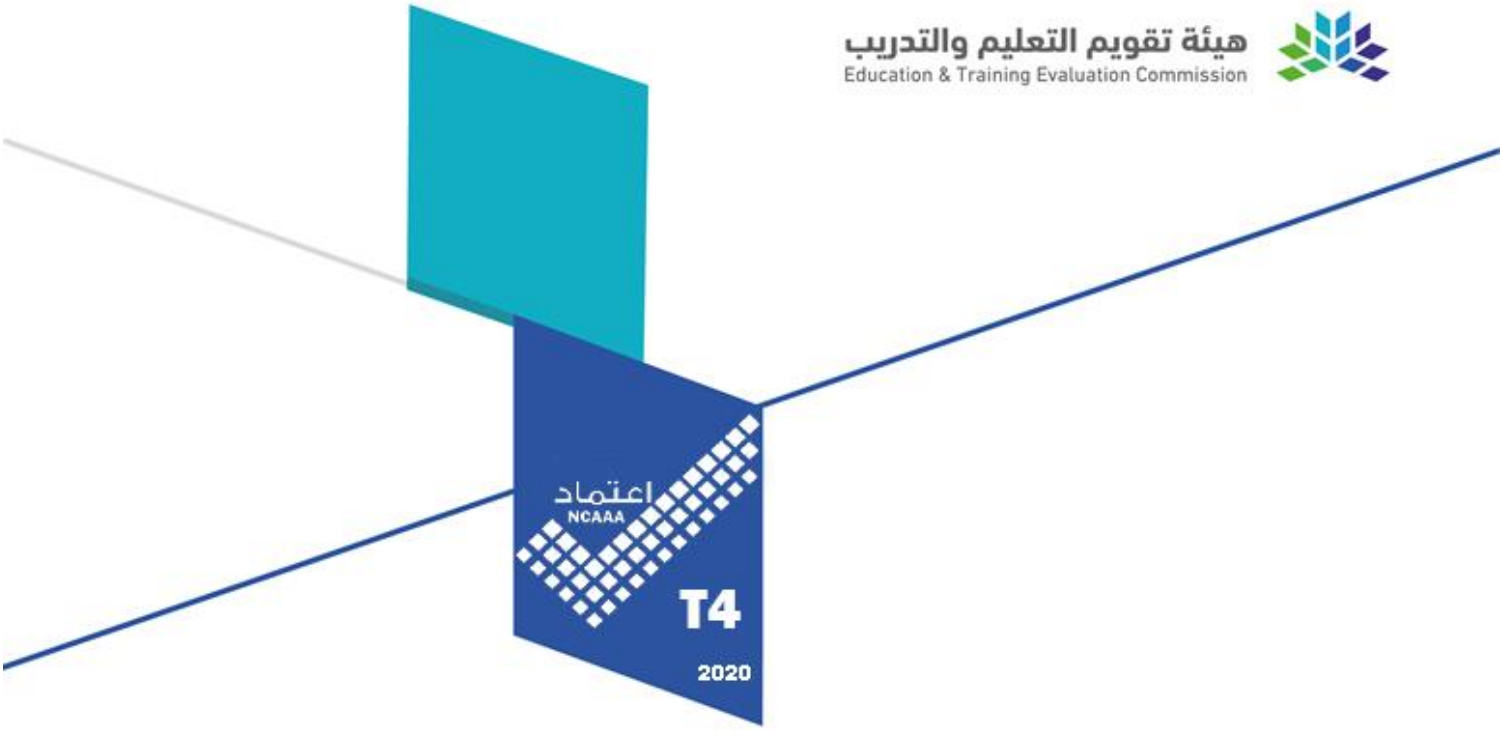
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Air and Water Pollution I**
Course Code:	**3hrs/ Week (2Lec. And 3 lab)**
Program:	**Environmental Science**
Department:	**Biology Department**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **3h.**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Sixth level, second year
4. Pre-requisites for this course (if any)**: Environmental pollution and risks**
5. Co-requisites for this course (if any)**:** **Principles in Ecology**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**90%**
2	**Blended**		
3	**E-learning**		**10%**
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	30h.
3	**Tutorial**	
4	**Others** (specify)	
	Total	50 h

B. Course Objectives and Learning Outcomes

1. Course Description

The course covers many critical pollution issues that result in air and water quality degradation. The topics covered in this course prepare students to understand the significance of appropriate sampling, data collection, and monitoring of health impacts of the air, and water pollution. The course describes air pollution as the accumulation in the atmosphere of substances that, in sufficient concentrations, endanger human health or produce other measured effects on living matter and other materials. Among the major sources of pollution are power and heat generation, the burning of solid wastes, industrial processes, and, especially, transportation.

Water pollution is described as the introduction into fresh waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in it. This process ranges from the simple addition of dissolved or suspended solids to the discharge of the most insidious and persistent toxic pollutants.

2. Course Main Objective

Upon completion of this course, students will be able to:

- Discuss the types of pollution (air and water pollution) that can impact human health.
- Describe the sampling procedures of pollutants present in the air and water.
- Discuss the potential exposure routes of air and water pollutants.
- Discuss the pollutant interactions that take place in the atmosphere.
- Describe steps are taken to control air and water pollution.
- Understanding the causes of global warming, ozone depletion, enhanced N and S emissions, and urban air pollution.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	To select the best sampling method according to sampling location and parameters properties.	K1
1.2	To differentiate between persistent organic chemicals and inorganic sources of water	K1
1.3	To provide students with knowledge on the types of environmental pollutants, industrial and natural sources.	K2
2	**Skills :**	
2.1	Analyze, synthesize, and evaluate evidence to understand problems and select control measures and techniques concerning atmospheric, water, or terrestrial challenges accordingly.	S1
2.2	Have gained awareness of current forms of environmental pollution and an overview of their causes and consequences to natural, economic and social systems.	S1
2.3	Have been exposed to learning examples of good practice of technologies and options used to remediate reduce/eliminate pollution of the environment,	S2
3	**Values:**	
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.	V1

CLOs		Aligned PLOs
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.	V1
3.3	Perform effective communication and positive relation with others and work as an influential team member.	V2
3.4	Demonstrate effective levels of initiative and proficiency in the use of communication and information technologies to learn and conduct research.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Structure of the atmosphere, ambient air quality: monitoring and standards. air quality index; sources and types of pollutants (primary and secondary).	4
2	Top ten gas in air pollution (CO, CO_2, NO, hydrocarbon, particulate, SO_2, volatile organic compound, Chlorofluorocarbons) causes, sources of air pollution, Harmful effects of air pollution, Control measures for air pollution.	4
3	Global warming, causes, and effects, photochemical smog, causes, and effects, acid rain causes, and effects	2
4	Mid- term exam	2
5	Sources of surface and ground water pollution; water quality parameters and standards, Water pollution definition, Distribution of water in the world	2
6	Causes of water pollution, pathogens, Oxygen depleting wastes, Inorganic plant nutrients, eutrophication, COD, BOD, bioaccumulation and biomagnification, Organic chemicals, Water-soluble inorganic chemicals, Sediment of suspended matter, Water-soluble radioactive isotopes, Hot water, Plastics, Alien species, water borne diseases	4
7	Industrial and Municipal Solid Waste Treatment and Disposal- Municipal Wastewater Treatment	2
8	Controlling of water pollution	2
	Lab Topics	
1	A sampling of air samples, Evaluating Air Quality by Measuring Common Air Pollutants	4
2	A sampling of water from different sources of water	2
3	Testing and Evaluating Basic Water Quality - Physical parameters of water quality+ mid term exam	4
4	Chemical parameters of water quality	2
5	Biological parameters of water quality	2
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	To select the best sampling method according to sampling location and parameters properties.	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class and applying this information in laboratory).	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports
1.2	To differentiate between persistent organic chemicals and inorganic sources of water		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	To provide students with knowledge on the types of environmental pollutants industrial and natural sources.	-Handout of lecture notes for each topic . -Small group discussions.	• Oral presentation • Lab work reports.
2.0	**Skills**		
2.1	Analyze, synthesize, and evaluate evidence to understand problems and accordingly select control measures and techniques concerning atmospheric, water, or terrestrial challenges.	• Application of essential scientific techniques through lectures and essays. • Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). • Lab reoprts	-Evaluation of the topics prepared by students. -Midterm and final exams -Checking the homework assignments
2.2	Have gained awareness of current forms of environmental pollution and an overview of their causes and consequences to natural, economic and social systems.		
2.3	Have been exposed to learning examples of good practice of technologies and options used to remediate reduce/eliminate pollution of the environment,		
3.0	**Values**		
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.		• Assignments (Individual and group) • Presentation (Individual and group) assessments. • Research assignments
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.		
3.3	Perform effective communication and positive relation with others and work as an effective team member.		
3.4	Demonstrate adequate levels of initiative and proficiency in the use of communication and information technologies to learn and conduct research.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam	5th	20
3	Mid-term Exam lab	5th	10
4	Final Exam lab	10th	20
5	Final Exam (written test) lecture	11 th	40

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.
- Laboratory assistance.
- E-mail communications.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Environmental soil and water chemistry, principles and applications V. P. Evangelou, John Wiley & Sons, Inc. New York. ISBN: 978-0-471-16515-65 Environmental Science: For the AP Course by Friedland and Relyea (Published by Bedford, freeman & worth, 3rd edition, 2019)
Essential References Materials	
Electronic Materials	• http://www.epa.gov/ • http://www.epa.gov/ebtpages/water.html • http://www.epa.gov/oar/ • http://www.epa.gov/oswer/riskassessment/risk_superfund.htm
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture room • Library. • Laboratory equpiments
Technology Resources (AV, data show, Smart Board, software, etc.)	• Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and	Program leader / Head of the Department Quality Committee	Annual program report

Evaluation Areas/Issues	Evaluators	Evaluation Methods
assessment of staff and the facilities in the college is taken from the students in order to develop in the year		

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

Prepared by faculty staff:

Dr. Hanan Osman

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Education & Training Evaluation Commission

Course Specifications

Course Title:	**Environment pollution and risks**
Course Code:	**2hrs/ Week (2Lec.)**
Program:	**Environmental Science**
Department:	**Biology Department**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **2h.**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered: Six level, Second year
4. Pre-requisites for this course (if any)**: Principle in Ecology**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		**80%**
2	**Blended**		
3	**E-learning**		**20%**
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20 h.
2	**Laboratory/Studio**	
3	**Tutorial**	10h
4	**Others** (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides students an introduction to issues related to environmental pollution, with emphasis on causes, pathways, risks, mitigation, and prevention. Also, its deals with major problems of pollution of marine the land surface and the food chain. It covers processes responsible for the occurrence and release of pollutants in the environment, dispersion mechanisms, the hazards associated with different types of contaminants, problems of accumulation of toxic substances, and procedures for reducing emissions and remediation of contaminated environments.

2. **Course Main Objective**

By the end of the course, students will have a broad, integrated understanding of the major problems associated with pollution of the marine and the land surface and the food chain. Students will be expected to be familiar with and have an understanding of:

- How pollution is caused by nuclear fuel production, processing of spent fuel, and disposal of radioactive wastes;
- Problems of pollution of the food chain by potentially toxic elements and persistent organic pollutions;
- Procedures and prospects for reducing unwanted emissions to the environment and remediation of already polluted systems.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	To understand the importance of using nonpolluting sources of energy for the environment.	K1
1.2	To apply fundamental principles to develop conceptual models of pollutant mobility and fate in the receiving environment.	K3
1.3	To learns soil contaminants.	K1
1.4	To provide students with knowledge on the types of environmental pollutants and industrial and natural sources.	K1
2	**Skills :**	
2.1	Be able to analyze, synthesize, and evaluate evidence to understand problems and accordingly select control measures and techniques concerning atmospheric, water, or terrestrial challenges.	S1
2.2	Gained awareness of current forms of environmental pollution and an overview of their causes and consequences on natural, economic, and social systems.	S3
2.3	Have been exposed to learning examples of good practice of technologies and options used to remediate /eliminate pollution of the environment,	S2
3	**Values:**	
3.1	Analyze and evaluate time management, discipline, and also to ethical behavioral, respect from different points of view.	V1
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.	V2
3.3	Perform effective communication and positive relation with others and work as an influential team member. .	V3

C. Course Content

No	List of Topics	Contact Hours
1	Definition of pollution; pollutants; classification of pollutants; solubility of impurities (hydrophilic and lipophilic pollutants), transfer of pollutants within different mediums, role of chelating agents in transferring contaminants.	2
2	Soil pollution, definition, causes of land pollution, anthropogenic causes of soil pollution, Excess use of fertilizers and pesticides. Effects of soil pollution	4
3	Noise pollution: What is Noise? Sources of Noise Pollution - Effects on Humans - Damaging Levels of Sound Effects on Humans. Effects on Wildlife	2
4	Midterm exam I	2

5	Marine Pollution, various causes of ocean pollution, Sewage Primary treatment, secondary treatment and advanced treatment, Toxic chemicals from industries, Large scale oil spills, Ocean mining, Devastating effects of ocean pollution	4
6	Food pollution, Causes of food pollution, Food pollutants (Pesticides, Perchlorate ClO4, Organic compounds of mercury, Benzene), Food pollution risks, Pollution affect a food web, Common food pollution diseases	2
7	Radioactive contamination, background radiation. Source contamination radiation • Radioactive Contamination: external and internal contamination • Fugitive dusts and resuspension • Noble Gases • Fallout/Fission products	4
8	Pharmaceutical pollutants, cosmetics, personal hygiene, and its impact on the environment and ways of safe disposal Medical and pathological wastes, the proper way of getting rid of it +Mid Term II	2
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	To understand the importance of using nonpolluting sources of energy to the environment.	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class. -Handout of lecture notes for each topic . -Small group discussions.	• Homework and Quizzes. • Midterm and final written exams • Evaluation of reports • Oral presentation
1.2	To apply fundamental principles to develop conceptual models of pollutant mobility and fate in the receiving environment		
1.3	To learns soil contaminants		
1.4	To provide students with knowledge on the types of environmental pollutants, industrial and natural sources.		
2.0	**Skills**		
2.1	Be able to analyze, synthesize, and evaluate evidence to understand problems and accordingly select control measures and techniques concerning atmospheric, water, or terrestrial challenges.	• Application of essential scientific techniques through lectures and essays. • Small group discussion • Ask the students to make small search projects during the semester • Class discussions (Engage students in interaction with questions and answers). • Homework assignments	-Evaluation of the topics prepared by students. -Midterm and final exams -Checking the homework assignments
2.2	Have gained awareness of current forms of environmental pollution and an overview of their causes and consequences to natural, economic and social systems.		
2.3	Have been exposed to learning examples of good practice of technologies and options used to remediate reduce/eliminate pollution of the environment,		
3.0	**Values**		
3.1	Analyze and evaluate time management, discipline, and also to ethical		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	behavioral, respect from different points of view.		• Assignments (Individual and group) • Presentation (Individual and group) assessments. • Research assignments
3.2	Learn continuously through self-reflection and or experience to recognize the value of learning.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Oral presentation	Weekly	10
2	Mid-term Exam I	5th	20
3	Mid-term Exam II	9th	20
4	Final Exam (written test)	11th	50
5			

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Faculty must be available for academic counseling and support as per the schedule mentioned.
- Laboratory assistance.
- E-mail communications.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- The following book will be the key course reference book: - M.K. Hill. Understanding Environmental Pollution. Cambridge University Press, 3rd Edition, 2010. - C. Baird and M. Cann. Environmental Chemistry. W.H. Freeman, 4th Edition, 2008. - C.V.A. Duke and C.D. Williams, Chemistry for Environmental and Earth Sciences. Cambridge University Press, 2008.
Essential References Materials	
Electronic Materials	Websites on the internet that are relevant to the topics of the course
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation	• Lecture room • Library.

Item	Resources
(Classrooms, laboratories, demonstration rooms/labs, etc.)	
Technology Resources (AV, data show, Smart Board, software, etc.)	•Computers and internet connection. • Active Board • Data show is required in every room
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Regular evaluation of the theoretical part of the course to identify the weakened areas	Faculty	Course report
Confidential completion of standard course evaluation questionnaires	Students	Course Evaluation Template
At the end of each semester feedback regarding the effective of teaching and assessment of staff and the facilities in the college is taken from the students in order to develop in the year	Program leader / Head of the Department Quality Committee	Annual program report

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T5 2019

Field Experience Specifications

Course Title:	**Internship**
Course Code:	
Program:	**Environmental Science**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al- Qura University**

Table of Contents

A. Field Experience Identification

1. Credit hours:3h
2. Level/year at which this course is offered: Level 9, Third year
3. Dates and times allocation of field experience activities. • Number of weeks: 15 week • Number of days: **75 days** • Number of hours: **450 hours**
4. Pre-requisites to join field experience (if any)**:**

B. Learning Outcomes, and Training and Assessment Methods

1. Field Experience Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Develop practical knowledge and skill in his/her chosen area.	K1
1.2	Become familiar with various method used in field work.	K2
1.3	An understanding of professional and ethical responsibility	K3
2	**Skills:**	
2.1	Get familiar with practical problems during field condition and to overcome it.	S1
2.2	Be able to develop research problem for higher studies.	S3
2.3	An ability to use the techniques, skills, and modern tools necessary for environment practice.	S4
3	**Values:**	
3.1	Developed skill to coordinate team work and to report individually.	V1
3.2	An ability to function on teams	V3

2.Alignment of Learning Outcomes with Training Activities and Assessment Methods

Code	Learning Outcomes	Training Methods/Activities	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Develop practical knowledge and skill in his/her chosen area.	• Daily attendance • Participating in the environmental work inside the training sites. • Writing follow up reports	• Final report • Final presentation and discussion
1.2	Become familiar with various method used in field work.		
1.3	An understanding of professional and ethical responsibility		
2.0	**Skills**		
2.1	Get familiar with practical problems during field condition and to overcome it.	• Daily attendance • Discussion with academic and field supervisors.	• Final report • Final presentation and discussion.
2.2	Be able to develop research problem for higher studies.		

Code	Learning Outcomes	Training Methods/Activities	Assessment Methods
2.3	An ability to use the techniques, skills, and modern tools necessary for environment practice.	• Perform one or more specified tasks as a member of team.	• Field supervisors evaluation • Academic supervisors evaluation
3.0	**Values**		
3.1	Developed skill to coordinate team work and to report individually.	• Perform one or more specified tasks as a member of team. • Participating in the environmental work inside the training sites.	• Final presentation and discussion. • Field supervisors evaluation • Academic supervisors evaluation
3.2	An ability to function on teams		

3. Field Experience Learning Outcomes Assessment

a. Students Assessment Timetable

#	Assessment task*	Assessment timing (Week)	Percentage of Total Assessment Score
1	Field Supervisor Assessment	All the weeks	35%
2	Department Training Committee	All the weeks	35 %
3	Discussion of trainee report at the end of the summer training	11th week	30%

***Assessment task** (i.e., Practical test, oral test, presentation, group project, essay, etc.)

b. Assessment Responsibilities

م	Category	Assessment Responsibility
1	**Teaching Staff**	-Instructs the student to the way, by which his report is written in a sound scientific manner; to take into account the general specifications of the report determined by the summer training unit. - Following-up students on an ongoing basis, and communicates with field supervisor in the training destination. - Keeping a complete file of the student. The file includes forms and relating documents for a full student's evaluation, through forms and documents installed to his/her attendance, his/her regularity in time. The student provides periodic reports (two during the training period and a final report.) Also, he/she provides models for the follow-up and assessment from the training firm. - Provides training files for students under his/her supervision. These files, including a copy of the final report are introduced to the department's head who, in his turn, is lifting a full copy to the summer training unit in order to make use of it when developing the final report of the summer training process.

2	**Field Supervisor**	The training destination (governmental or private) that are selected by the College to implement the training program, approved by the College, for all students enrolled in the training program during the considered time-period; must take into account the following: - To determine per each student or more a training supervisor, to make sure that training course is in accordance with the plan approved by college. - Treatment of the problems and difficulties that may face the student training plan. - Fills out the form: "Student Summer Training Evaluation" for each trainee under his/her supervision. The form is delivered to the officials of the training at the college at the end of the training time-period in a sealed envelope.
3	**Others** (specify)	

C. Field Experience Administration

1. Field Experience Locations

a. Field Experience Locations Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
The field of environmental conservation	Approval by Biology Department	Approval by Biology Department
The field of wildlife		
Natural Reserves		
Research area		

*Ex: provides information technology ,equipment ,laboratories ,halls ,housing ,learning sources ,clinics etc.

**Ex: Criteria of the training institution or related to the specialization, such as: safety standards, dealing with patients in medical specialties, etc.

b. Decision-making procedures for identifying appropriate locations for field experience

A location can be approved as a suitable field experience location only it in fulfills the aforementioned list of requirements.
All field experience locations are well-known governmental or private sectors, institutions and establishments.

2. Supervisory Staff

a. Selection of Supervisory Staff

Selection Items	Field Supervisor	Teaching Staff
Qualifications	PhD in Biology, especially in environmental science	Faculty staff members
Selection Criteria		

b. Qualification and Training of Supervisory Staff

(Including the procedures and activities used to qualify and train the supervisory staff on supervising operations, implementing training activities, the follow-up and evaluation of students, etc.)

3. Responsibilities

a. Field Experience Flowchart for Responsibility

including units, departments, and committees responsible for field experience, as evidenced by the relations between them.

b. Distribution of Responsibilities for Field Experience Activities

Activity	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, ...)	✓	✓		✓	✓
Follow up on student training activities	✓	✓		✓	✓
Adjusting attendance and leave	✓	✓		✓	✓
Assessment of learning outcomes	✓	✓		✓	✓
Evaluating the quality of field experience	✓	✓		✓	✓
Others (specify)					

4. Field Experience Implementation

a. Supervision and Follow-up Mechanism

An academic staff member will visit the students at their training locations twice a month (total 6 visits) to meet them and listen to their feedback, and evaluate their experience. In the same visit the staff member will meet the person in charge of their training and discuss with them all issues related to the students (attitude, learning progress, commitment, etc). These follow ups are part of the overall assessment of the course.

b. Student Support and Guidance Activities

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
Typical injuries in the field	Training location provides students with personal	Wearing personal protective equipment
	Training location offers students a workshop on safety rules and regulations	Following the safety rules and regulations of the training location

G. Training Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

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	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T5 2019

Field Experience Specifications

Course Title:	**Internship**
Course Code:	
Program:	**Environmental Science**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al- Qura University**

Table of Contents

A. Field Experience Identification

1. Credit hours:3h
2. Level/year at which this course is offered: Level 9, Third year
3. Dates and times allocation of field experience activities. • Number of weeks: 15 week • Number of days: **75 days** • Number of hours: **450 hours**
4. Pre-requisites to join field experience (if any)**:**

B. Learning Outcomes, and Training and Assessment Methods

1. Field Experience Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Develop practical knowledge and skill in his/her chosen area.	K1
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2	**Skills:**	
2.1	Get familiar with practical problems during field condition and to overcome it.	S1
2.2	Be able to develop research problem for higher studies.	S3
2.3	An ability to use the techniques, skills, and modern tools necessary for environment practice.	S4
3	**Values:**	
3.1	Developed skill to coordinate team work and to report individually.	V1
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2.Alignment of Learning Outcomes with Training Activities and Assessment Methods

Code	Learning Outcomes	Training Methods/Activities	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Develop practical knowledge and skill in his/her chosen area.	• Daily attendance • Participating in the environmental work inside the training sites. • Writing follow up reports	• Final report • Final presentation and discussion
1.2	Become familiar with various method used in field work.		
1.3	An understanding of professional and ethical responsibility		
2.0	**Skills**		
2.1	Get familiar with practical problems during field condition and to overcome it.	• Daily attendance • Discussion with academic and field supervisors.	• Final report • Final presentation and discussion.
2.2	Be able to develop research problem for higher studies.		

Code	Learning Outcomes	Training Methods/Activities	Assessment Methods
2.3	An ability to use the techniques, skills, and modern tools necessary for environment practice.	• Perform one or more specified tasks as a member of team.	• Field supervisors evaluation • Academic supervisors evaluation
3.0	**Values**		
3.1	Developed skill to coordinate team work and to report individually.	• Perform one or more specified tasks as a member of team. • Participating in the environmental work inside the training sites.	• Final presentation and discussion. • Field supervisors evaluation • Academic supervisors evaluation
3.2	An ability to function on teams		

3. Field Experience Learning Outcomes Assessment

a. Students Assessment Timetable

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3	**Others** (specify)	

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1. Field Experience Locations

a. Field Experience Locations Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
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Research area		

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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, ...)	✓	✓		✓	✓
Follow up on student training activities	✓	✓		✓	✓
Adjusting attendance and leave	✓	✓		✓	✓
Assessment of learning outcomes	✓	✓		✓	✓
Evaluating the quality of field experience	✓	✓		✓	✓
Others (specify)					

4. Field Experience Implementation

a. Supervision and Follow-up Mechanism

An academic staff member will visit the students at their training locations twice a month (total 6 visits) to meet them and listen to their feedback, and evaluate their experience. In the same visit the staff member will meet the person in charge of their training and discuss with them all issues related to the students (attitude, learning progress, commitment, etc). These follow ups are part of the overall assessment of the course.

b. Student Support and Guidance Activities

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
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	Training location offers students a workshop on safety rules and regulations	Following the safety rules and regulations of the training location

G. Training Quality Evaluation

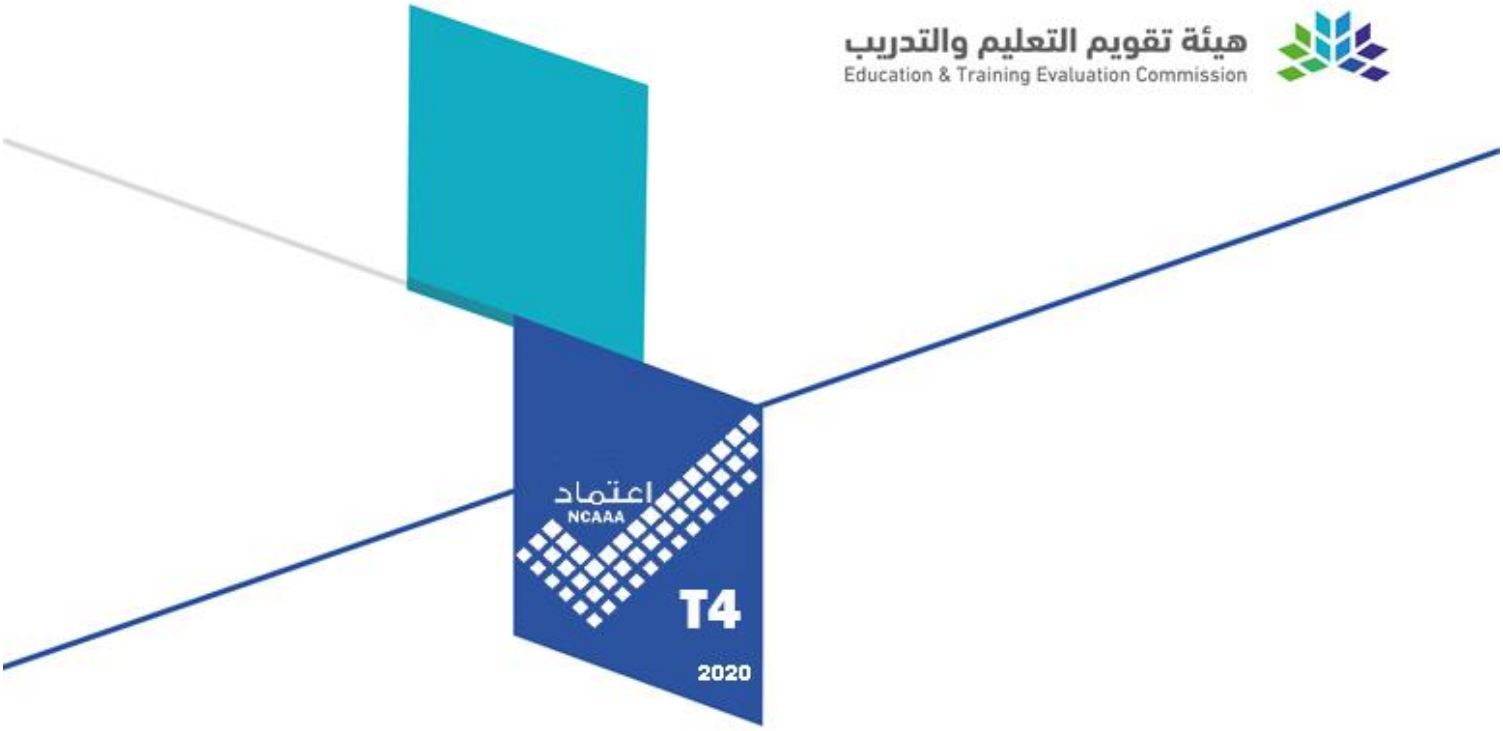
Evaluation Areas/Issues	Evaluators	Evaluation Methods

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	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**The Red Sea and Arabian Golf Environment**
Course Code:	
Program:	**BSc Environmental Sciences**
Department:	**Biology**
College:	**Faculty of Science**
Institution:	**Umm Al-Qura university**

Table of Contents

A. Course Identification

1. Credit hours:	**3**
2. Course type	
a.	University ☐ College ☐ Department ■ Others ☐
b.	Required ■ Elective ☐
3. Level/year at which this course is offered:	**Level 8 / Year 3**
4. Pre-requisites for this course (if any)**:**	**- Natural environments in Saudi Arabia.**
5. Co-requisites for this course (if any)**:**	**None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**		
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	20
2	**Laboratory/Studio**	16
3	**Tutorial**	
4	**Others** (specify)	
	Total	36

B. Course Objectives and Learning Outcomes

1. Course Description

An overview of marine biology that surveys the diversity of marine habitats, major groups of taxa inhabiting those habitats, and the general biology of the various taxa. Topics include the impacts of climate change and other anthropogenic impacts in the Red Sea and Arabian Golf. Species diversity, structure of marine food webs, and the flow of energy within different marine habitats will be detailed and contrasted. The course will cover the major marine ecosystem types and the ecology of the adaptations of marine life occupying these habitats. There will be a particular emphasis on Red Sea systems.

2. Course Main Objective

- Apply science concepts to make decisions (weighing risks and benefits) about students' personal health and well-being.
- Describe how information is acquired through observations and measurements of marine phenomena.
- Demonstrate a manifestation of the critical thinking skills by examining marine biological-oriented problems.
- Describe the structure, function, and behavior of representative marine life forms.
- Describe interactions between physical and biological factors occurring in various marine environments.
- Identify and describe major energy transformations in the marine environment.
- Identify and analyze current issues in marine science and technology.
- Describe the impact of current marine-oriented issues on human and other populations.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Define what marine biology is and why it is important to study.	
1.2	Describe geology and the Red Sea and Arabian Golf, currents, and tides.	
1.3	Understanding the nomenclature of marine biology.	
1.4	Identify invertebrates of the marine environment.	
1.5	Identify vertebrates of the marine environment.	
1.6	Identify marine fish.	
1.7	Identify marine mammals.	
1.8	Describe marine ecosystems.	
1.9	Summarize what estuaries are and why they are important.	
1.10	Summarize coral reef biology and ecosystems.	
1.11	Describe life in the polar oceans and the open sea.	
1.12	Describe life in the Red Sea and Arabian Golf depth and its future with humans.	
2	**Skills:**	
2.1	**Cognitive Skills:** - The ability to know the general characteristics of marine vital areas. - The ability to be aware of the environmental factors - chemical, physical and biological - which affect the marine environment. - The ability to be aware of plankton, nektonic and benthic communities in the marine environment. - The ability to understand the interrelationships between plants, animals and the marine environment. - The ability to identify and classify marine organisms. - The ability to know the equipment used in collecting the local marine flora and fauna. -Ability to evaluate field trips and related experiences. - The ability to comprehend the economic importance of the natural resources of the sea. - The ability to develop an understanding of the human impact on the balance of nature in marine environments.	

CLOs		Aligned PLOs
2.2	**Interpersonal Skills and Responsibility:** At the end of the course, the student will be able to: - Be involved in self-directed learning. - Succeed in team Works. - Share and discuss results with others. - Be involved in a simple research project. - Evaluate answers and positively criticize them.	
2.3	**Communication, Information Technology and Numerical Skill** The student can propose solutions to some problems**:** - Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information. - Able to calculate and discuss the facts and logical propose methods to solve the difficulties.	
2.4	**Psychomotor Skills (if applicable)** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	
3	**Values:**	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3.4	- Communicate results of work to others.	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Marine Sciences – chemistry, physics, geology, biology, oceanography.	2
2	Marine Biodiversity in the Red Sea and Arabian Golf – overview of systematics and speciation.	2
3	Invertebrate Zoology – marine animals without a backbone.	2
4	Marine Vertebrate Zoology – fishes, reptiles, birds, and mammals.	2
5	Coral Reef Ecosystems and Climate Change – coral bleaching.	2
6	***Mid-Term Exam.***	2
7	-The Microbial World – microbial ecology of the Red Sea and Arabian Golf.	2

	- Marine Macrophytes – seaweeds, seagrasses and mangroves.	
8	Coastal Ecosystems - the intertidal zone, estuarine systems, and the continental shelf.	2
9	Open Sea Ecosystems - pelagic habitats and the deep sea.	2
10	Marine Ecology – biogeochemical cycles.	2
11	Climate Change – the impacts of global change on marine ecosystems.	2
12	***Final Examination.***	2
Total		24

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Define what marine biology is and why it is important to study.	-Teaching strategies to be used to develop that knowledge. - Lectures -Take home Assignment. - Internet activities.	1. Course work reports 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the topic. 3. Midterm and final exams 4. Checking the homework assignments
1.2	Describe geology and the Red Sea and Arabian Golf, currents, and tides.		
1.3	Understanding the nomenclature of marine biology.		
1.4	Identify invertebrates of the marine environment.		
1.5	Identify vertebrates of the marine environment.		
1.6	Identify marine fish.		
1.7	Identify marine mammals.		
1.8	Describe marine ecosystems.		
1.9	Summarize what estuaries are and why they are important.		
1.10	Summarize coral reef biology and ecosystems.		
1.11	Describe life in the polar oceans and the open sea.		
1.12	Describe life in the Red Sea and Arabian Golf depth and its future with humans.		
2.0	**Skills**		
2.1	**Cognitive Skills** -The ability to know the general characteristics of marine vital areas. -The ability to be aware of the environmental factors - chemical, physical and biological - which affect the marine environment. -The ability to be aware of plankton, nektonic and benthic communities in the marine environment.	- Lectures. - Brain storming. - Discussion. - Seminars. - Self assessment.	1. Course work Reports. 2. Evaluation of the topics prepared by students according to the content, arrangement, and covering of the

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	-The ability to understand the interrelationships between plants, animals and the marine environment -The ability to identify and classify marine organisms. -The ability to know the equipment used in collecting the local marine flora and fauna. -Ability to evaluate field trips and related experiences. -The ability to comprehend the economic importance of the natural resources of the sea. -The ability to develop an understanding of the human impact on the balance of nature in marine environments.	- Examination of selected micrographs and hand drawings.	topic. 3. Midterm and final Exams. 4. Checking the homework assignments.
2.2	**Interpersonal Skills & Responsibility** - Be involved in self-directed learning. - Succeed in teamwork. - Share and discuss results with others. -Be involved in simple research project. -Evaluate answers and positively criticize them.	-Case Study. -Active learning. -Small group discussion -Cooperative learning and application of scientific method in thinking the scientific problem solving. -Work as part of a team.	-Assissent of group assignements. -Evaluate the independent assignements.
2.3	**Communication, Information Technology, Numerical** -Use information and communication technology. - Use IT and communication technology in gathering and interpreting information and ideas. - Use the internet as a means of communication and a source of information. - Encourage students to use internet for searching certain electronic journals regarding topics of the course. - Scientific writing. - Use his/her observations to solve problems. - Doing research and conduct searches for restoring information.	-Oral presentations. - Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	- Able to calculate and discuss the facts and logical propose methods to solve the difficulties.		
2.4	**Psychomotor:** (Description of the psychomotor skills to be developed and the level of performance **required:** -Enhancing the ability of students to use computers and internet to prepare a research article. - Interpret the laboratory data**.**	- Follow-up students during field visits and write reports on them.	- Evaluating the laboratory written reports. - Evaluating the community participation**.**
3.0	**Values**		
3.1	- Use information and communication technology.	-Oral presentations. -Internet search assignments and essays. -Incorporating the use and utilization of computer in the course requirements. -Students will be asked for delivering a summary regarding certain topics related to the course.	-Evaluation of student essays and assignments. -Marks given to for good reports and presentations -Evaluating during the discussion in lecture and reports. -Part of the grad is put for student's written participation.
3.2	-Use IT and communication technology in gathering and interpreting information and ideas.		
3.3	-Use the internet as a means of communication and a source of information.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid-Term Exam.	6 th week	20 %
2	Activities.	10 th week	10 %
3	Final practical exam.	11 th week	30 %
3	Final theory exam.	12 th week	40 %

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1- Marine Biology by Peter Castro, et al. McGraw Hill (1997). 2- Seaside Naturalist: A Guide to Study at the Seashore by Deborah A. Coulombe. McGraw Hill (1997).
Essential References Materials	-An Introduction to the Biology of Marine Life James L. Sumich Wm. C. Brown Company, 1988. IV. OBJECTIVES 1. GENERAL.
Electronic Materials	
Other Learning Materials	- Copies of all necessary material will be provided to the students. - Copies of additional recommended reading textbooks will be ordered at the library.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Computer laboratory might be used for software applications (homework's and design problem).
Technology Resources (AV, data show, Smart Board, software, etc.)	A combination of white board use, hand-outs, PowerPoint slide presentations, and interactive class discussions will be used. Open discussions are favored as they encourage students to participate and exchange and enhance the overall learning process.
Other Resources (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	A site visit may be arranged during the course.

G. Course Quality Evaluation

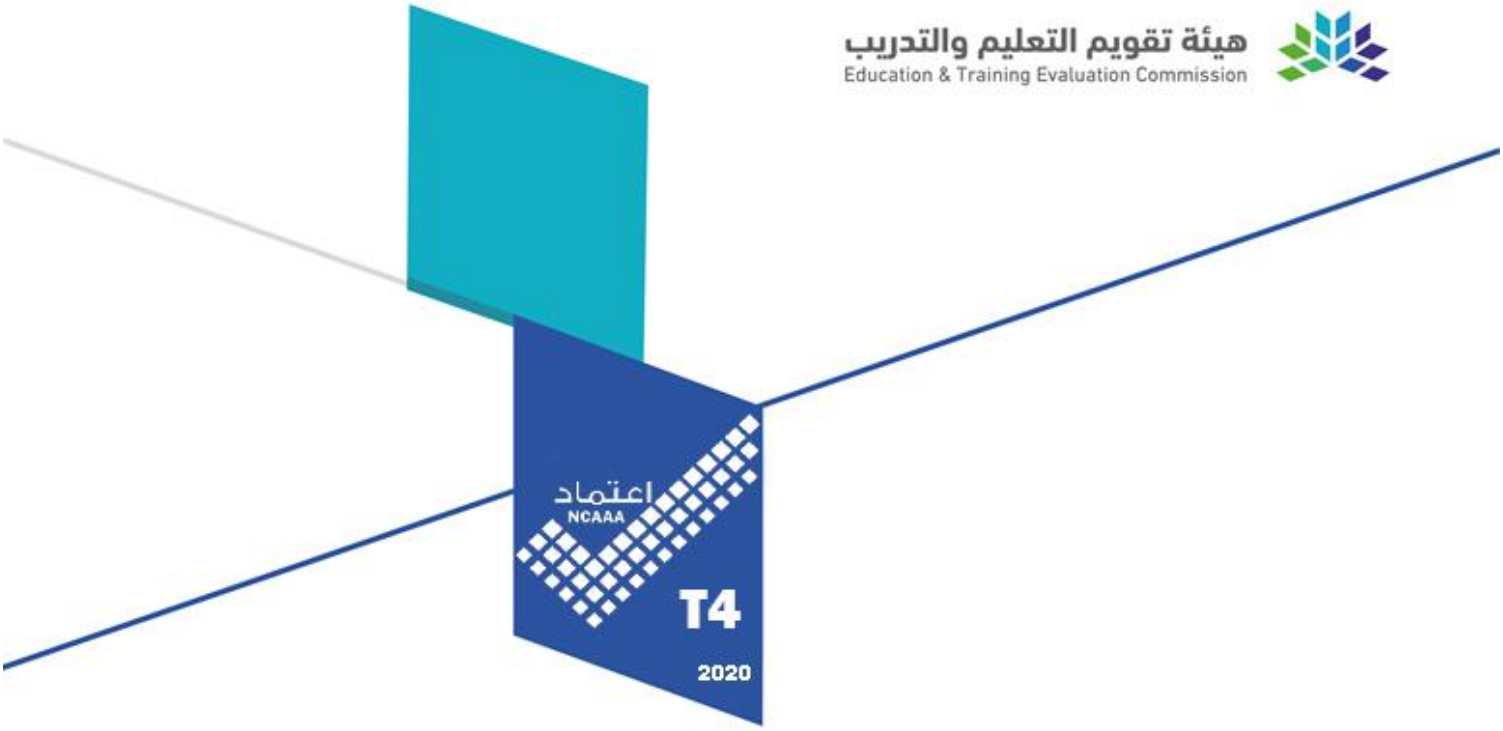
Evaluation Areas/Issues	Evaluators	Evaluation Methods
-Strategies for Obtaining student feedback on Effectiveness of teaching.	-The instructor or by the department.	Distribution of questionnaires for course evaluation by students. Students- faculty meetings.
- Other Strategies for Evaluation of teaching.	- The instructor or by the department.	-Data show is required in every room. -Smart Board departmental plan committee. -Peer consultation by departmental specialized committee. -Self-evaluation of the program by the departmental studying plan committee.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Waste treatment**
Course Code:	
Program:	**Environmental Science**
Department:	**Chemistry**
College:	**Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 2hrs
2. Course type **a.** University ☐ College ☐ Department ■ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: 8th level/3rd year
4. Pre-requisites for this course (if any)**: Chemical Safety**
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**	---	---

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	√
2	**Laboratory/Studio**	---
3	**Tutorial**	---
4	**Others** (specify)	6
	Total	26

B. Course Objectives and Learning Outcomes

1. Course Description

This course explained different method for waste minimization, recycling and treatment in many industrial fields.

2. Course Main Objective

By finishing the course, the student will be familiar with waste characteristics, control technologies, management strategies, facility innovations, process alternatives, costs, case histories, and future trends for each industrial and commercial operation.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	Recognize waste minimization, recycling, and cleaner production	K2
1.2	Identify the characteristics of hazardous industrial waste	K1

CLOs		Aligned PLOs
1.3	Explain some concepts about soil remediation	K3
2	**Skills :**	
2.1	Summarize the treatment of nonferrous metal manufacturing wastes	S4
2.2	Identify the waste treatment in the aluminum forming industry	S6
2.3	Illustrate Outline the waste management in the pulp and paper industry	S2
2.4	Develop treatment methods for nickel-chromium plating waste	S4
3	**Values:**	
3.1	Demonstrate commitment to professional and academic values, and ethics in the field of soil remediation	V1
3.2	Write and present a chemical report related to waste minimization, recycling, and cleaner production.	V4

C. Course Content

No	List of Topics	Contact Hours
1	Waste Minimization, recycling, and Cleaner Production	4
2	Characteristics of Hazardous Industrial Waste	4
3	Treatment of Nonferrous Metal Manufacturing Wastes	2
4	Waste Treatment in the Aluminum Forming Industry	2
5	Soil Remediation	2
6	Treatment of Wastes from Metal Finishing Industry	2
7	Waste Management in the Pulp and Paper Industry	2
8	Treatment of Nickel-Chromium Plating Waste	2
Total		**20**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**		
1.1	Recognize waste minimization, recycling, and cleaner production	Lectures	Final and mid-term exam.
1.2	Identify the characteristics of hazardous industrial waste	Lectures Library visits Web based study.	Assignments and activities
1.3	Explain some concepts about soil remediation	Lectures	Exams
2.0	**Skills**		
2.1	Summarize the treatment of nonferrous metal manufacturing wastes	Lectures	Quiz.
2.2	Identify the waste treatment in the aluminum forming industry	Lectures	Exams
2.3	Illustrate Outline the waste management in the pulp and paper industry	Lectures	Final and mid-term exam.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Develop treatment methods for nickel-chromium plating waste	Lectures	Quiz.
3.0	**Values**		
3.1	Demonstrate commitment to professional and academic values, and ethics in the field of soil remediation	Web-based study	Class discussion
3.2	Write and present a chemical report related to waste minimization, recycling, and cleaner production.	Scientific discussion	Assignment activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	-	10%
2	First Periodic Exam.	4	20%
3	Second Periodic Exam.	10	20%
4	Final Exam. (2 hours exam)	12	50%
5	**Total**		**100%**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- A faculty member was assigned to provide counseling and advice (about 20-25 student/ one faculty member).
- Office hours of the instructor: during the working hours weekly.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Advances in Hazardous Industrial Waste Treatment, LAWRENCE K. WANG, NAZIH K. SHAMMAS, YUNG-TSE HUNG, 2009 by Taylor & Francis Group, LLC. Handbook of Industrial and Hazardous Wastes Treatment, LAWRENCE K. WANG, YUNG-TSE HUNG, NAZIH K. SHAMMAS, 2010 by Taylor and Francis Group, LLC.
Essential References Materials	Electronic lecture handouts are available for the students either on blackboard or via their e-mail
Electronic Materials	Chemistry related web sites such as: http://www.chemweb.com http://www.sciencedirect.com http://www.rsc.org
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with capacity of (30) students.
Technology Resources (AV, data show, Smart Board, software, etc.)	Teaching halls and laboratories are equipped with data show projector ad electronic board screen
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Some Specialized software's for chemistry e.g. Institutional License for Chem Office , ACD labs, etc.

G. Course Quality Evaluation

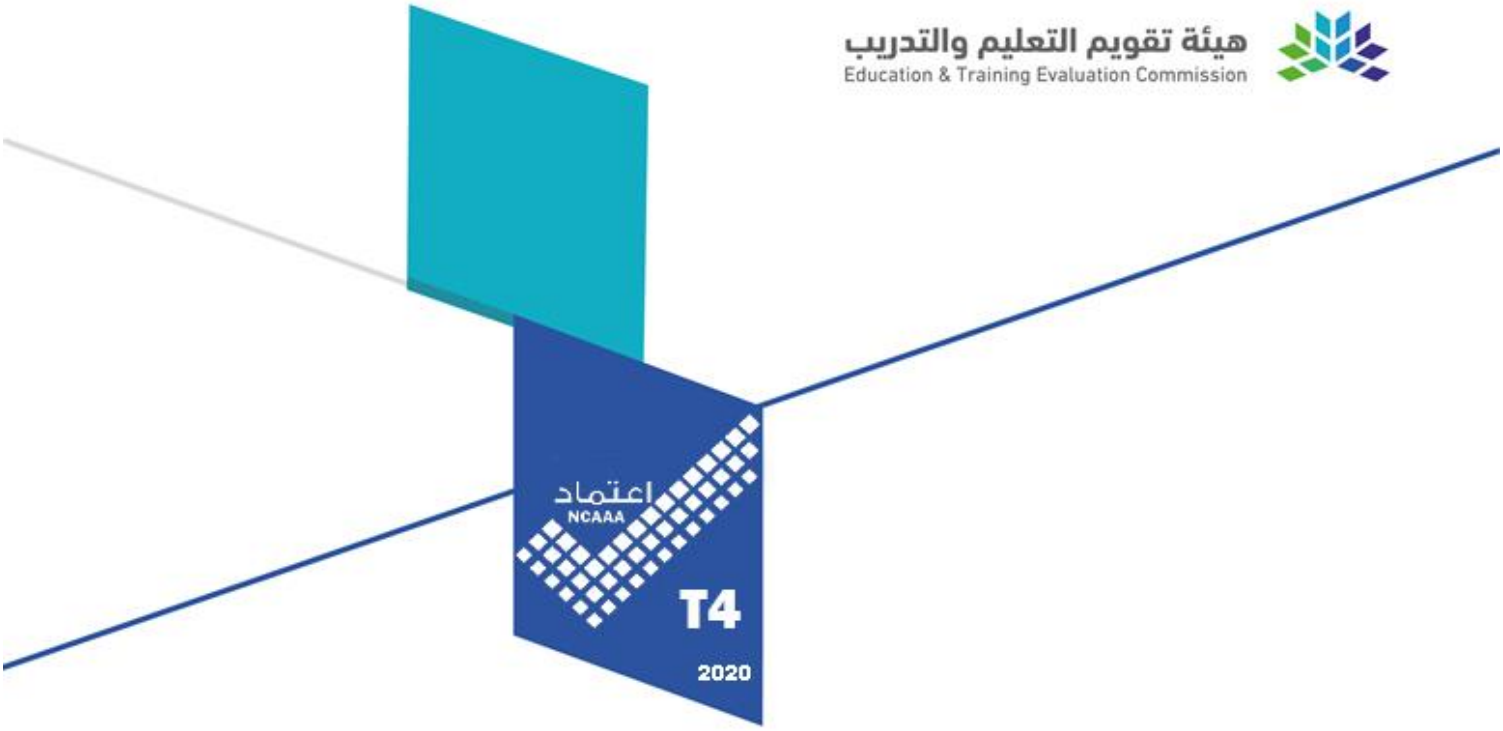
Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Online survey at the end of the semester (Program survey, Experience survey &course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	Direct (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Assessment of faculty members	Department head	Direct (Performance Assessment of faculty
Quality of learning resources	Students	Direct (feedback from faculty).

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

H. Specification Approval Data

Council / Committee	Quality committee and department Council
Reference No.	
Date	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Water Resources**
Course Code:	
Program:	BSc. Environmental Sciences
Department:	**Biology**
College:	**Sciences**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: **3 per week**
2. Course type **a.** University ☐ College ☐ Department ☒ Others ☐ **b.** Required ☒ Elective ☐
3. Level/year at which this course is offered:
4. Pre-requisites for this course (if any)**:** Environmental Physics
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	30	%100
2	**Blended**		
3	**E-learning (self-learning)**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others**	
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

The course handles the various aquatic systems in the globe and their roles in the hydrological cycles. The various forms of freshwater sources along with their spatial occurrences and distribution are fundamental components of the course. The course will coin the saline water aquatic systems and the wastewater as potential water resources for the human communities. The various pattern of using freshwater, wastewater, and saline water resources will be handled in the course. The international and national water management rules and strategies will be addressed as well.

2. Course Main Objective

The principal objective of the course is providing undergraduate students with the ability to:

- identify the various water resources,
- recognize of the spatial occurrences and distributions of different water resources,
- define the various patterns of using the various water resources,
- propose an integrated water management strategy, and
- be aware by international and national water laws, regulations, and policies.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Identify the concepts and theories of the hydrological cycle.	K^1
1.2	Mention the various forms of aquatic systems	K^1
1.3	Enumerate the spatial occurrences and distributions of freshwater, wastewater, and saline water systems.	K^2
1.4	Argue the various policies and strategies of adopting successful water management practices.	K^3
2	**Skills :**	
2.1	Differentiate between the various types of water resources	S^1
2.2	Interpret the spatial distributions and spatial relationships in each geographic region.	S^1
2.3	Explain various scenarios of achieving successful water management strategies of different water resources.	S^1
2.4	Determine the best pattern of using freshwater resources	S^2
3	**Values:**	
3.1	Cooperate responsibly and effectively within the teamwork	V^3

C. Course Content

No	List of Topics	Contact Hours
1	Water resources in the context of hydrological cycles and deep-seated acquirers	**3**
2	Surface freshwater resources	**3**
3	Groundwater water resources	**3**
4	Marine water resources	**3**
5	Wastewater resources	**3**
6	The spatial occurrences, extents, and distribution of the various water resources	**3**
7	Forms and pattern of using the freshwater water resources	**3**
8	Forms and pattern of using the saline and wastewater resources water resources	**3**
9	Integrated Water Resources Management	**3**
10	Environmental rules, regulations, and policies of using water resources	**3**
Total		**30**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Identify the concepts and theories of the hydrological cycle.	1. Lecturing 2. Starting with topic outlines. 3. Demonstrate the basic principles. 5. Solve problem 6. Brain storming	a) Mid exam. b) Final exam. c) Homework. d) Oral Questions.
1.2	Mention the various forms of aquatic systems		
1.3	Enumerate the spatial occurrences and distributions of freshwater, wastewater, and saline water systems.		
1.4	Argue the various policies and strategies of adopting successful water management practices.		
2.0	**Skills**		
2.1	Differentiate between the various types of water resources	1. Lecturing 2. Starting with topic outlines. 3. Demonstrate the basic principles. 5. Solve problem 6. Brain storming	a) Mid exam. b) Final exam. c) Homework. d) Oral Questions.
2.2	Interpret the spatial distributions and spatial relationships in a given geographic region.		
2.3	Explain various scenarios of achieving successful water management strategies of different water resources.		
2.4	Determine the best pattern of using freshwater resources		
3.0	**Values**		
3.1	Cooperate responsibly and effectively within the teamwork	1. Presentations 2. Scientific reports and team projects.	Reports and presentations evaluation.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Weekly quizzes	Through term	10
2	Homework	Through term	10
3	Mid Exam	6	30
4	Final Exam	12	50

***Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)**

E. Student Academic Counseling and Support

Arrangements for the availability of faculty and teaching staff for individual student consultations and academic advice:

• Forming a committee for academic guidance.
• Determine the first week of each semester for academic advising activities.
• Activities include giving lectures on the undergraduate program by selected professors.
• Distributing brochures to bachelor's degree students.
• Supporting the student with guiding information that helps him achieve excellence in his academic performance.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Holden, Joseph, 2014. Water Resources: An integrated approach. Routledge, Tylor & Francis, London & New York.
Essential References Materials	Environmental low, Ministry of Environment, Water, and Agriculture, Riyadh, Saudi Arabia
Electronic Materials	Saudi Digital Library
Other Learning Materials	Ministry of Environment, Water, and Agriculture

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data Show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Feedback from students regarding the effectiveness of teaching:	Course teacher	• Applying the measurement and evaluation form at the end of the semester to identify the teacher's performance and to evaluate the male/female students' performance

Evaluation Areas/Issues	Evaluators	Evaluation Methods
		through test results during the semester. • Actual monitoring of the student's performance in theoretical and practical training.
Evaluation of the teaching process by the professor:	Course instructor and faculty members	• Surveying of the opinions of male/female students by the professor after completing each section of the course.
Teaching Development:	Course teacher	• Continuous use of computer and other technologies provided by the university, in addition to external programs and technologies. • Continuous review of the contents of the course in the light of developments in science and technology. • Updating the course content with recent information from scientific periodicals, research and foreign books.
Student achievement: Verified by:	Curriculum melody in the department	• Marking a sample of students' work by faculty members from within the department. • Consulting with faculty members regarding the composition of final exam questions and results. • Covering the course with questions in the midterm and final exams.

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	