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

Course Specification
(Bachelor)

Course Title:	Air and Water Pollution
Course Code:	BIOE2504
Program:	Environmental Sciences
Department:	Biology
College:	Sciences
Institution:	Umm Al-Qura University
Version:	V1
Last Revision Date:	29 January 2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 Cr. Hrs.)					
2 Hrs. Lecture + 3 Hrs Practical					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 4 / Year 2)					
4. Course General Description:					
This course explores the fundamentals of air and water pollution, focusing on their causes, effects, monitoring, and control technologies. Students will examine key pollutants, their impact on human health and the environment, and regulatory frameworks governing pollution control. Through theoretical learning, laboratory experiments, and case studies, students will develop analytical and problem-solving skills to assess pollution levels and design mitigation strategies. Emphasis is placed on scientific principles, technological advancements, and sustainability approaches to pollution management.					
5. Pre-requirements for this course (if any)**:**					
BIOE2503 Environmental Pollution					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					

- Understand the fundamental concepts of air and water pollution, including sources, types, and environmental impacts.
- Analyze the relationship between pollution and climate change, emphasizing key pollutants and regulatory policies.
- Apply scientific methods to measure and assess air and water quality using laboratory techniques and real-world data.
- Evaluate pollution control technologies and strategies for mitigating environmental contamination.
- Develop innovative and sustainable solutions to address air and water pollution through research and case studies.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5hr./week	100%
2	E-learning	0	
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

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

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the major sources, types, and effects of air and water pollutants on human health and the environment.	**K1**	Lectures, Self-directed private study	Examinations, Written and practical tests
1.2	Explain the principles behind air and water pollution control technologies, including filtration, scrubbers, and	**K4**	Lectures, Web-based study, Laboratories	Examinations, Discussion sessions

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	wastewater treatment.			
1.3	Analyze the relationship between air pollution and climate change, emphasizing the role of greenhouse gases and particulate matter.	**K2**	Lectures, Web-based study, Individual and Group presentations	Report and research, Answers through discussion in Blackboard
1.4	Evaluate global and national air and water quality standards, regulations, and policies for pollution control.	**K3**	Lectures, Self-directed private study, Discussion sessions	Written and practical tests, Report and research
2.0	**Skills**			
2.1	Apply appropriate methods for air and water quality assessment, including pollutant measurement and data interpretation.	**S3**	Laboratories, Web-based study, Individual and Group presentations	Practical tests, Report and research
2.2	Investigate the impact of urbanization and industrialization on air and water pollution through case studies and research.	**S4**	Library visits, Web-based study, Discussion sessions	Report and research, Active participation of students within their group
2.3	Develop solutions for reducing pollution through innovative technologies and sustainable practices.	**S2**	Individual and Group presentations, Self-directed private study	Project production

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.4	Compare the effectiveness of different pollution control measures in various environmental settings.	**S1**	Lectures, Web-based study, Laboratories	Examinations, Discussion sessions
2.5	Design an awareness campaign or action plan to mitigate air and water pollution in a community setting.	**S5**	Individual and Group presentations, Self-directed private study	Project production
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate a commitment to environmental sustainability by advocating for responsible air and water resource management.	**V1**	Discussion sessions, Web-based study, Individual and Group presentations	Active participation of students within their group
3.2	Engage in ethical decision-making regarding pollution control and environmental protection policies.	**V2**	Lectures, Self-directed private study, Discussion sessions	Report and research, Answers through discussion in Blackboard
3.3	Promote awareness and proactive behavior in reducing air and water pollution through education and community involvement.	**V3**	Individual and Group presentations, Web-based study	Project production

C. Course Content

No	List of Topics	Contact Hours
1.	Major Sources and Types of Air Pollutants – Natural vs. anthropogenic sources, including primary and secondary pollutants.	2
2.	Health Effects of Air Pollution – Respiratory diseases, cardiovascular impacts, and long-term exposure risks.	2
3.	Air Quality Standards and Regulations – National and international policies for air pollution control.	2
4.	Climate Change and Air Pollution – The role of greenhouse gases and particulate matter in global warming.	2
5.	Urban Air Pollution and Smog Formation – Causes, effects, and mitigation of photochemical and industrial smog.	2
6.	Indoor Air Pollution: Sources and Health Risks – Common indoor pollutants, such as volatile organic compounds (VOCs) and mold.	2
7.	Technologies for Air Pollution Control – Filtration systems, scrubbers, and catalytic converters.	2
8.	Impact of Transportation on Air Quality – Emissions from vehicles and sustainable transportation alternatives.	2
9.	Sources and Types of Water Pollutants – Agricultural runoff, industrial discharge, and domestic waste.	2
10.	Eutrophication and Its Ecological Consequences – Nutrient pollution leading to algal blooms and oxygen depletion.	2
11.	Heavy Metal Contamination in Water Bodies – Effects of lead, mercury, and arsenic pollution on ecosystems and health.	2
12.	Microplastics in Water: Sources, Impacts, and Solutions – The growing concern of plastic pollution in freshwater and marine systems.	2
13.	Waterborne Diseases and Public Health – Pathogens in contaminated water and their effects on human health.	2
14.	Wastewater Treatment and Management – Processes like primary, secondary, and tertiary treatment for pollution reduction.	2
15.	Oil Spills and Their Environmental Impact – Causes, consequences, and remediation techniques for oil pollution in water bodies.	2
	Practical (Lab.) Topics	
P1	Measurement of Particulate Matter in Ambient Air - Use air quality monitors to measure and analyze particulate pollution levels in different environments.	3
P2	Detection and Quantification of Gaseous Pollutants (CO, NO_2, SO_2) -	3

	Employ gas sensors or spectrophotometry to measure the concentration of common air pollutants.	
P3	Air Quality Index (AQI) Calculation and Data Analysis - Collect real-time air pollution data, compute AQI values, and interpret air quality trends.	3
P4	Efficiency Testing of Air Purification and Filtration Systems - Evaluate the performance of HEPA filters, activated carbon, and wet scrubbers in removing pollutants.	3
P5	Indoor vs. Outdoor Air Quality Comparison - Analyze VOCs, CO_2, and particulate concentrations in indoor and outdoor environments.	3
P6	Analysis of pH, Conductivity, and Turbidity in Water Samples – Basic water quality testing using laboratory instruments.	3
P7	Measurement of Nitrate and Phosphate Levels in Water – Investigating nutrient pollution and its role in eutrophication.	3
P8	Heavy Metal Contamination in Water (Lead, Mercury, Arsenic) – Using atomic absorption spectroscopy or test kits to detect toxic metals.	3
P9	Microplastic Detection in Water Samples – Filtering and identifying microplastics using microscopy techniques.	3
P10	Wastewater Treatment Process Demonstration – Simulating primary, secondary, and tertiary treatment methods in a lab setup.	3
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Lec. Activities	perdiocially	10
2.	Lab. Quiz	4-5	10
3.	Mid-Term Exam	7-9	20
4.	Final Lab.	16	20
5.	Final Lec.	17	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Harrison, R. M. (Ed.). (2023). *Pollution: Causes, effects and control* (5th ed.). Royal Society of Chemistry.**

	Richard, G., Sawyer, W.E., Sharipov, A. (2024). Environmental Impacts of Air Pollution. In: Ogwu, M.C., Izah, S.C. (eds) Sustainable Strategies for Air Pollution Mitigation. The Handbook of Environmental Chemistry, vol 133. Springer, Cham. https://doi.org/10.1007/698_2024_1114 Saxena, N., Islam, M.M., Sharma, D. (2024). Water Pollution: A Threat to Ecosystem. In: Water Pollution and Remediation. SpringerBriefs in Water Science and Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-76301-4_1
Supportive References	**- Yerramilli, A. (2019). *Air pollution: Prevention and control technologies* (2nd ed.). BSP Books Pvt. Limite. - Madhav, S. *et al.* (2020). *Water Pollutants: Sources and Impact on the Environment and Human Health*. In: Pooja, D., Kumar, P., Singh, P., Patil, S. (eds) Sensors in Water Pollutants Monitoring: Role of Material. Advanced Functional Materials and Sensors. Springer, Singapore. https://doi.org/10.1007/978-981-15-0671-0_4**
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. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Lecture room • Library • Laboratory equpiments
Technology equipment (projector, smart board, software)	• Computers and internet connection. • Active Board • Data show is required in every room
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Students, Course Review Committee	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Students, Course Review Committee	Indirect
The extent to which CLOs have been achieved	Course Review Committee	Direct and Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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

Course Specification
(Bachelor)

Course Title:	Heat and Waves
Course Code:	PHYS2706
Program:	Environmental Science
Department:	Physics
College:	Science
Institution:	Umm Al-Qura University
Version:	47
Last Revision Date:	18/4/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (Level 5)					
4. Course General Description:					
The course will cover the principles of general physics of heat and waves, such as oscillations, wave mechanics, temperature, and heat and laws of thermodynamics, kinetic theory of gas, and waves interference and diffraction.					
5. Pre-requirements for this course (if any)**:**					
General Physics 1 PHYS1101					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
After completing this course student should be able to deal with the following concepts: **1.** oscillation and wave motion. **2.** oscillations **3.** motion in one dimension, circular motion and vibration. **4.** wave motions. **5.** temperature, Heat, and first law of thermodynamics, kinetic theory of gas.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	90	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

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

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the physical properties of vibration and waves	K1	Lectures and lab experiments	Exams, homework, quizzes and lab reports
1.2	Describe the effects of interference and diffraction	K2		
…				
2.0	**Skills**			
2.1	Solve problems related to waves and vibration.	S1	Lectures and lab experiments	Exams, homework, quizzes and lab reports

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.2	Apply physics laws to solve problems related to the laws of thermodynamics.	S2		
2.3	Analyze the results of experiments	S3		
…				
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively individually or within a team	V1	Lectures and lab experiments	Exams and lab reports
...				

C. Course Content

No	List of Topics	Contact Hours
1.	**Oscillations** ● Simple Harmonic Motion ● The Force Law for Simple Harmonic Motion ● Energy in Simple Harmonic Motion ● An Angular Simple Harmonic Oscillator ● Pendulums ● Simple Harmonic Motion and Uniform Circular Motion ● Damped Simple Harmonic Motion ● Forced Oscillations and Resonance	6
2.	**Waves-I** ● Types of Waves ● Transverse and Longitudinal Waves ● Wavelength and Frequency ● The Speed of a Traveling Wave ● Wave Speed on a Stretched String ● Energy and Power of a Wave Traveling Along a String ● The Wave Equation ● The Principle of Superposition for Waves	6

	• Interference of Waves • Standing Waves	
3.	**Waves-II** • Sound Waves • The Speed of Sound • Traveling Sound Waves • Interference • Intensity and Sound Level • Sources of Musical Sound • Beats • The Doppler Effect • Supersonic Speeds, Shock Waves	6
4.	**Temperature, Heat, and First Law of Thermodynamics** • Temperature • The Zeroth Law of Thermodynamics • Measuring Temperature • The Celsius and Fahrenheit Scales • Thermal Expansion • Temperature and Heat • The Absorption of Heat by Solids and Liquids • A Closer Look at Heat and Work • The First Law of Thermodynamics • Some Special Cases of First Law of Thermodynamics • Heat Transfer Mechanisms • Systems with Varying Mass: a Rocket	6
5.	**The Kinetic Theory of Gases** • Avogadro's Number • Ideal Gases • Pressure, Temperature, and *rms* Speed • Translational Kinetic Energy • Mean Free Path • The Distribution of Molecular Speeds • The Molar Specific Heats of an Ideal Gas	6

	• Degrees of Freedom and Molar Specific Heats • The Adiabatic Expansion of an Ideal Gas	

Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam (or 2 major exams)	8th week (or 4th and 10th)	30%
2.	HomeWorks & Quizzes	All weeks	20%
3.	Final Exam	End of term	50%
...	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Halliday & Resnick, Jearl Walker, "Fundamentals of Physics" 10th Edition (2018)
Supportive References	Physics for Scientists & Engineers with Modern Physics 4th Edition by Douglas Giancoli, 4th Edition (2014).
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom • Laboratory • Library
Technology equipment (projector, smart board, software)	• Blackboard • Projector
Other equipment (depending on the nature of the specialty)	• Laboratory

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Questionnaire (direct)
Effectiveness of Students assessment	Instructor	Peer review of exam marking (direct)
Quality of learning resources	Instructor	Course report (direct)
The extent to which CLOs have been achieved	Instructor	Course report (direct)
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physics Department Council
REFERENCE NO.	Minutes of session No. xx
DATE	x/x/2025

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Flora**
Course Code:	BIOE2303
Program:	**Environmental sciences**
Department:	Biology
College:	**Faculty of Science**
Institution:	UMM AL – QURA UNIVERSITY
Version:	1
Last Revision Date:	**Pick Revision Date.**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐ University	☐College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4)					
4. Course general 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 providing an overview of Phytogeographical regions of Saudi Arabia. The approaches to the study of phytogeography. Furthermore, this course gives a student information about Floristic Composition and Main Vegetation Types of Saudi Arabia, and conservation of natural flora..					
5. Pre-requirements for this course (if any)**:**					
(BIOE1501) Ecosystem in Saudi					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
- 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.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5h/week	100
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	35
3.	Field	10
4.	Tutorial	
5.	Others (specify)	
Total		

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain the foundational principles of flora and their importance in understanding plant diversity.	K1, k3	-In-class lecturing -Homework assignments -Discussions (connecting what they learn in the class. -Handout lecture notes for each topic. -Small group discussions	-Homework and Quizzes. -Midterm and final exams -Evaluation of reports
1.2	Describe the different phytogeographical regions of the Kingdom	K1		
	Recognize types of environments and plant populations	K3		
2.0	**Skills**			
2.1	Conduct plant Collection and document plant specimens using	**S1**	-The use of computers and the internet.	E-valuation of the topics and

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	scientifically approved techniques		-Small group discussion -Ask the students to dry plant samples of local flora -Class discussions (Engage students in interaction with questions and answers)	reports prepared by students. -Assess the students in practical lessons. -Checking the homework assignments
2.2	Perform field surveys and assess the species composition of Makkah city	**S2**		
2.3	Perform information collection from more than one source	**S3**		
3.0	**Values, autonomy, and responsibility**			
3.1	create a spirit of cooperation, understanding, respect and responsibility	**V1**	-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.
3.2	work in groups to improve the skills of relationship with others	**V2**		
3.3	cooperation in solving the problems of the students in the compilation of scientific material	**V3**		

C. Course Content

No	List of Theoretical Topics	Contact Hours
1.	Introduction and Principles of Flora	2
2.	Herbarium and Botanical Garden, Role and Importance in the Science of Flora	2
3	Species Endemism and conservation	2
4	Plants geography (phytogeography)	2

5	Plant communities	2
6	The plant life forms	2
7	Overview on Flora Saudi Arabia	2
8	Geomorphology and climatology of plant regions in Saudi Arabia + main vegetation types (habitats)	2
9	Flora of Mountains	2
10	Flora of Coastal plains	2
11	Flora of Deserts	2
12	Flora of Najd plateau	2
13	Flora of northern province	2
14	Flora of islands	2
15	Overview of Flora of Makkah (Wadis Environment and the Most Famous Plants)	2
Total		30

No	List of Practical Topics	Contact Hours
1	The Herbarium & Procedure of the Plant Collection	3
2	Plant Pressing and Drying	3
3	Plants that are Need a Special Treatments	3
4	Mounting Specimens	3
5	Labelling	3
6	Caring to Herbarium Specimens	3
7	Preservation and storage “Herbarium Cabinets”	3
8	Other methods of Preservation	3
9	Species list of KSA flora	3
10-15	Samples identification (using books, herbarium collections, websites, Computers programs, and smartphone applications).	3

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	4th	10 (Theoretical+ Practical)
2.	Mid-term Exam	8th	20
3.	Search and Reports	14th	10
4	Final Exam (written test)	16th	40 + 20 (Theoretical+ Practical)

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	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.
Supportive References	Festschrift, P. 2012. Plant Taxonomy; Past, Present, and Future. Energy and Resources Institute. India. Stace, C. A. 2000. Plant Taxonomy and Biosystematics., University of Leicester
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 Saudi Wildlife Authority. https://www.swa.gov.sa/en/Pages/SearchResults.aspx?k Thomas, J. 2020. *Plant Communities and Plant Associations- Saudi Arabia* [Online]. Available: http://www.plantdiversityofsaudiarabia.info/Biodiversity-Saudi-Arabia/Vegetation/Plant%20Communities%20and%20Plant%20Associations-Saudi%20Arabia.htm
Other Learning Materials	Web sites, U Tubes. Scientific videos and films.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1. Lecture room suitable for 40 students. 2. Lecture room equipped with Data show. 3. Biology laboratory.
Technology equipment (projector, smart board, software)	1. Computers or internet connection. 2. Active Board. 3. Data show is required in every room
Other equipment (depending on the nature of the specialty)	Laboratory instruments & equipment: light microscope, flasks, beakers, slides and tips and chemicals kits.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Course lecturer	direct
Effectiveness of	Course lecturer	direct

Assessment Areas/Issues	Assessor	Assessment Methods
Students assessment		
Quality of learning resources	Course lecturer	direct
The extent to which CLOs have been achieved	Course lecturer	direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Specification
(Bachelor)

Course Title:	**Eco-biochemistry**
Course Code:	**BIOE2505**
Program:	**Environmental Sciences**
Department:	Biology
College:	Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4 th level, second year)					
4. Course general Description:					
This course deals with studying the active constitute in plant and animal as well as explaining the biological importance of carbohydrates, proteins, fats, amino acid and nucleic acids for living organisms.					
5. Pre-requirements for this course (if any)**:**					
Organic chemistry CHM1415					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
• Recognize the active constitute in plant and animal cells, show the biological importance of sugar, proteins, fats, and nucleic acids in organismal cells, explain the differences between the three major classes of sugars, memorize the significance of amino acids and proteins, explain the differences between DNA and RNA nucleic acids. Understanding the hormonal interactions between plants and animals. • Provide students with information needed to understand plant toxins and their effect on behaviors and pathogen and hormonal interactions between plants and animals in the environment.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**5hr/Week**	**100%**
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

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

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Know and define the biochemical mechanisms responsible for physiological adaptation to different environmental conditions.	**K1**	Lectures Brain storming Homework assignments	Paper-based exams
1.2	know and define the mechanisms of action and signaling pathways through which specific pollutants and global warming interfere with the regulation of metabolic and physiological processes with significant consequences for human health.	**K1**	lecture Small groups discussions.	Evaluation of reports Oral presentation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Illustrate facts and concepts across biochemical reactions in biological systems.	**S1**	Lectures- small group activity Homework assignments	Practical reports- Practical exam
2.2	To evaluate the risk of toxins and biochemical component to the organisms and the environment	**S1**		Paper-based exams
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.	**S1**		Evaluation of reports
3.0	**Values, autonomy, and responsibility**			
3.1	Take responsibility for performing tasks and achieving common goals.	**V1**	Interactive learning	Assignments

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction and definition of Biochemistry** Importance of water to the biological system, cells and respond to change in their environments. Cell envelope, cell cytoplasm, cell wall and its biosynthesis,	**2L + 3P**
2.	**Carbohydrates Structure and Function** - Carbohydrates in food are important source of energy - Types of carbohydrates	**2L + 3P**
3.	-Glucose (structure and its importance and regulation in blood by insulin and glucagon hormones and Diabetes risk of health problems including heart attack, stroke and kidney failure) - Fructose, galactose, and ribose (structure and its importance in cells and human body	2L + 3P

	-Sucrose, Lactose, and maltose (Structure and its roles and reaction in animal and plant cells).	
4.	**Carbohydrates Structure and Function** - Glycogen (structure and functions in animal) o Glycogen formation in the liver and muscles. o Glycogen regulation by hormones in blood stream. o Glycogenesis and glycogenolysis in animal body. - Starch in plant (structure and functions in plant) - Cellulose, the major structural polymer in plant and its functions and its importance to the plant cells.	2L + 3P
5.	**Carbohydrates Structure and Function** - Glycolysis is an energy-conversion pathway in animal, and plant - Formation of ATPs in cytoplasm and mitochondria of living cells. - Citric acid cycle in animal and plant. - The citric acid cycle is a source of biosynthetic precursors. - Metabolic strategies: Fermentation, Respiration and Photosynthesis.	2L + 3P
6.	**Proteins Structure and Function** - Importance of Protein to the biological system. - Protein are bult from a repertoire of 20 amino acids. - Classification of amino acids. - The amino acid sequence of a protein determines its three-dimensional structure.	2L + 3P
7.	Define ecological biochemistry. • Explain biochemical adaptation and the roles of secondary compounds. • Describe detoxification and the primary metabolic pathways in plants and animals. • Explain the key processes and factors involved in biotransformation & biodegradation. •Explain the concepts of sequestration, bioaccumulation, and biomagnification. • Contrast different forms of ecological biochemical, interaction.	6L + 3P
8.	Synthesis and transformation of chemicals in the environment, as the result of biochemical processes in an organism, to aid in species survival. • Includes: biochemical adaptation. • Biosynthesis., detoxification, biodegradation, biomineralization, Bioaccumulation, biomagnification. 4. Ecological biochemical interaction. The metabolic flexibility of a living organism to fit into a changing environment, improving chances for survival and reproduction. – Evolution • Many generations. – Acclimatization. • Lifetime of an individual.	**6L + 9P**

	Proteins Structure and Function - How antibodies to specific proteins can be generated. - The digestion and absorption of dietary proteins. - The Urea Cycle in animal. - Defects of Urea Cycle can lead to physiological damage.	3L + 3P
	Lipids and Cell membranes - Three common types of cell membrane lipids. - Classification of Lipids. - Types of fatty acids. - Dietary lipids are digested by pancreatic lipases. - Ketone bodies are a major fuel in some tissues. - Cholesterol (types- functions- importance to the biological system).	3L + 3P
		30L+45P

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Periodic Exam	4th week	5%
2.	Second Periodic Exam	12th week	5%
3.	Midterm Practical Exam	8th week	10%
4.	Midterm Written Exam	8th week	20%
5.	Final term Practical Exam	16th week	20%
6.	Final Term Written Exam	16th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Richards, I.S. , 2007 , Principles and Practice of Toxicology in Public Health. , Bartlette publishers Krauss, G-J., Nies, D.H. , 2014 , Ecological Biochemistry: Environmental and Interspecies Interactions. , Wiley and Co;VCH Verlag GmbH and Co. KGaA Hochachka, P.W., Somero, G.N. , 2002 , Biochemical Adaptation. , Princeton Press Buchanan, B.B., Gruissem, W., Jones, R.J. , 2000 , Biochemistry and Molecular Biology of Plants , American Society of Plant Physiologists, Pub. Fowden, L., Mansfield, T., Stoddart, J. , 1993 , Plant Adaptation to Environmental Stress , Chapman & Hall.
Supportive References	Introduction to Ecological Biochemistry by J.B.harborne, Academic press, 4th edition.

Electronic Materials	www.google.com
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture rooms facilitated with data show devices 40 students/lecture
Technology equipment (projector, smart board, software)	Data show devices and Digital board
Other equipment (depending on the nature of the specialty)	Chemicals and equipment needed for eco-biochemistry practical activities.

F. Assessment of Course Quality

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

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	BIOLOGY DEPARTMENT
REFERENCE NO.	PROGRAMMES AND CURRICULMS COMMITTEE OF BIOLOGY DEP.
DATE	

Course Specification
(Bachelor)

Course Title:	Quantitative Chemical Analysis
Course Code:	CHM2240
Program:	Environmental Sciences
Department:	Chemistry
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	*Course Specification Version Number*
Last Revision Date:	5/2/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 h, 2 theoretical + 1 practical)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th level/2nd year)					
4. Course general Description:					
The course provides students with the necessary background of quantitative chemical analysis of different compounds using different tools of analysis and their application.					
5. Pre-requirements for this course (if any)**:**					
Instrumental Chemical Analysis CHM2227					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
1. Describe the theoretical principles of quantitative analysis. 1. Familiar with statistical methods and solution concentration parameters in chemical measurements 1. Apply the procedures required for gravimetric analysis and factors which affect the precipitation process 1. Be further prepared for the necessary rigorous sequence in chemistry courses need the volumetric and gravimetric analysis.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	72	100%
2	E-learning	---	---
3	Hybrid • Traditional classroom • E-learning	---	---
4	Distance learning	---	---

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	42
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		72

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Express analytical results using appropriate units of concentrations and statistical forms.	K2	- Lectures - Scientific discussion	Mid-term exam Final exam
1.2	Recognize the fundamentals of titration theories and precipitation equilibria.	K2	- Lectures - Web based study	Mid-term exam Final exam
2.0	**Skills**			
2.1	Recall various applications of various types of titrations.	S1	Lab experiments	- long and short essays - posters lab manuals
2.2	Apply calculations for titrations and precipitation equilibria.	S4	Lab experiments Lectures	Lab exam
2.3	Apply suitable methods referred to concentration units.	S3	- Lectures	Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively both in a team, and	V1	- Project - Presentation	Write a report and

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	independently on solving some titration and gravimetric analysis problems.			Observation of group's teamwork performance
3.2	Manage resources, time and collaboration with members of the group.	V3	- Group discussion	Observation by the instructor

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	4
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.	Mid Term exam	2
9.	Factors affecting the solubility of precipitates, precipitation from homogeneous solution and contamination of precipitates, types of contamination (co-precipitation, post precipitation, surface adsorption)	2
10.	The sample preparation and the use of quantitative analysis for environmental purposes; particularly food and soil.	2
11.	Organic precipitants, requirements and their application-Inorganic precipitants, requirements and their application	4
12.	Calculations of gravimetric analysis	2
13.	Revision	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework and/or activities.	During all weeks	10%
2.	Midterm Exam.	8	20%
3.	Practical Exam.	15	30%
4.	Final Exam. (2 hours exam)	16-17	40%
Total		**---**	**100%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1- Douglas A. Skoog, Donald M. West, James F. Holler and Stanley R. Crouch, Analytical Chemistry, 7th edition, Springer (2014). 2- Gary D. Christian, Purnendu K. Dasgupta and Kevin A. Schug, Analytical Chemistry, 7th edition, WILEY (2014).
Supportive References	---
Electronic Materials	• http://www.chemweb.com • http://www.sciencedirect.com • http://www.rsc.org
Other Learning Materials	Lecture Handouts available on the coordinator website

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- Classrooms capacity (40) students. - Lab's capacity (20) students. -Providing hall of teaching aids including computers and projector.
Technology equipment (projector, smart board, software)	Room equipped with computer and projector and TV.
Other equipment (depending on the nature of the specialty)	No other requirements

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct: assessment of CLO Indirect: regular surveys to evaluate teaching effectiveness and course relevance.
Effectiveness of Students' assessment	Peer review	Direct: annual review of course contents by faculty members
Quality of learning resources	Students	Indirect: regular surveys to evaluate quality of learning resources
The extent to which CLOs have been achieved	Peer reviewer	Direct: annual review of course contents by faculty members
Other	---	---

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**CHEMSITY DEPARTMENT, FACULTY OF SCIENCE**
REFERENCE NO.	
DATE	**5/2/2025**