

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**



Academic Program and Course Description Guide

2025–2026

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Basrah
Faculty/Institute: Science
Scientific Department: Ecology
Academic or Professional Program Name: Ecology
Final Certificate Name: Science of Ecology
Academic System:
Description Preparation Date:
File Completion Date:

Signature:

Head of Department Name: مستشفى عبد الوهاب نجم
الأستاذ الدكتور

Date: 10/9/2025

Signature:

Scientific Associate Name:

Date:

الأستاذ الدكتور
عادل علي عبد الحسين
معاون العميد للشؤون العلمية وإدارة مائة الثانية



The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Runya Ali Hussain
10/9/2025

Approval of the Dean

الأستاذ الدكتور
علي عبد الامام عبد الزهرة
عميد كلية العلوم / جامعة البصرة

1. Program Vision

To position the Department of Ecology as a leading and distinguished department among Colleges of Science at the national, Arab, and international levels in both theoretical and applied environmental sciences.

2. Program Mission

The Department of Ecology provides distinguished educational, research, and consultancy programs in environmental sciences that meet the current and future needs of both governmental and non-governmental sectors. This is achieved by preparing specialized scientific personnel equipped with advanced knowledge and technical skills that contribute to environmental improvement. The Department accomplishes this through quality assurance in all educational, research, and consultancy activities, continuous professional development of its academic and administrative staff, and community service through seminars, workshops, and regular scientific conferences.

3. Program Objectives

1 To graduate qualified academic professionals by preparing graduates specialized in environmental sciences who possess the theoretical knowledge and practical skills required to work in academic, governmental, and industrial sectors, and by offering advanced academic programs in environmental sciences.

2 To achieve leadership in scientific research and environmental technological development by supporting scientific research in the fields of environmental sustainability and encouraging research projects that address local and global environmental issues.

3 To promote sustainable development by raising awareness among individuals and communities about the importance of the environment through educational and awareness programs targeting different age and social groups, and by developing curricula that emphasize environmental sustainability and its impact on daily life.

4 To contribute to solving environmental problems, such as air and water pollution, desertification, and the depletion of natural resources, through cooperation with governmental institutions and non-governmental organizations, and by developing innovative solutions through scientific research and field applications.

5 To contribute effectively to environmental policy planning by working with relevant ministries, such as the Ministries of Environment and Agriculture, to provide scientific solutions based on data collected through environmental research and surveys.

6 To implement the quality assurance and academic accreditation standards issued by the Ministry of Higher Education and Scientific Research, thereby contributing to improving the quality of education and scientific research in the fields of environmental sciences.

4. Program Accreditation

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5. Other external influences

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6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	6	13	9%	Compulsory
College Requirements	9	26	18%	Compulsory
Department Requirements	43	103	73%	Compulsory & elective
Summer Training	√	-	-	
Other				

* This can include notes whether the course is basic or optional.

* This can include notes whether the course is basic or optional.

7. Program Description				
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Level 1	W101	Human Rights Principles	3	0
	SP101	sport	1	1
	D101	Arabic Literature	2	0
	C100	General Geologist	2	0
	A127	Calculators	2	3
	R101	Calculus	4	0
	R117	Statistics	2	0
	P102	Properties of the material	3	3
	K112	Organic Chemistry	2	3
	K131	Analytical Chemistry	3	3
	E101	General Biology	3	3
	E102	Environment Fundamental	3	3
	E110	Molecular Cell Biology	2	3
	E111	Photography and nature	1	0
Level 2	W201	Principles of Freedom and Democracy	3	0
	C260	Calculator Applications	2	3
	Ch240	Biochemistry	2	3
	E202	Plant classification	2	3
	E203	Plant ecology	2	3
	E204	Animal Classification	2	3
	E205	Animal ecology	2	3
	E206	Climate change	2	0
	E207	Wandering and Productivity	2	3
	E208	Biodiversity& Sustainable development	2	3
	E 209	Microbiology	2	3
	E 210	Environmental Chemistry	2	3
	E 216	Environmental Geology	2	0
Level 3	D301	English Literature	2	0
	E 302	marine ecology	2	3
	E 303	Methods of separation & automated analysis	2	3
	E 304	Wetland environment	2	3
	E 305	Air pollution	2	3

	E 306	Water and soil pollution	2	3
	E310	Nature Reserves	2	0
	E311	Freshwater and estuary environment	2	3
	E314	Natural Resources and Energy Sources	2	0
	E317	Environmental Modeling	2	0
	E316	Environmental Survey and Maps	2	0
	E333	Meteorology	2	0
	E340	Environmental disasters	2	0
	E343	Organic pollution	2	3
	E347	Microbial contamination	2	3
	E351	Water Treatment Technologies	2	3
	E356	Aquatic plants	2	3
	E370	Radioactive contamination	2	0
Level 4	W 400	Environmental awareness	2	0
	E401	Waste Treatment and Recycling	2	0
	E402	Environmental Laws and Legislation	2	0
	E405	Research Project	2	0
	E410	Environmental physiology	2	3
	E421	Environmental toxins	2	3
	E430	Molecular Environmental Biology	2	3
	E436	Hydrological	2	0
	E444	Environmental Impact Assessment	2	0
	E450	Parasitizing plants and their environments	2	3
	E452	Occupational Health and Safety	2	0
	E456	Botanical Techniques	2	3
	E465	Remote sensing and GIS	2	0
	E487	Environmental Sanitation	2	0

8. Expected learning outcomes of the program

Knowledge

Learning Outcomes 1

- A1.** Ability to distinguish environmental problems and identify different types of pollutants in various environmental media, including water, air, and soil.
- A2.** Ability to identify appropriate solutions to different environmental problems.
- A3.** Ability to conduct field and laboratory measurements and tests with quality assurance, analyze and interpret results, and draw scientific conclusions.

Skills	
Learning Outcomes 2	B1. Possession of the theoretical and practical skills required for work in the academic, governmental, and industrial sectors, and the ability to contribute to advanced academic programs in environmental sciences. B2. Ability to conduct field and laboratory environmental research, identify different organisms, diagnose environmental problems, and support research projects addressing local and global environmental issues. B3. Ability to contribute to sustainable development by raising environmental awareness among individuals and communities through educational and awareness programs for different age and social groups, and by developing curricula focused on environmental sustainability and its influence on daily life. B4. Ability to address environmental problems such as air and water pollution, desertification, and depletion of natural resources in cooperation with governmental bodies, ministries, and non-governmental organizations, and to develop innovative solutions through research and field application.
Ethics	
Learning Outcomes 3	C1. Demonstrate ethical and professional responsibility in dealing with different environmental issues. C2. Make appropriate environmental judgments and propose solutions while considering financial, environmental, societal, and global dimensions.

9. Teaching and Learning Strategies

Problem-based learning focused on environmental issues is part of the program's teaching and learning strategy. Students are divided into groups, and each group is assigned an environmental problem occurring in the Iraqi or local environment. This approach stimulates thinking and discussion, while each group member contributes to analyzing and solving the problem. Students subsequently discuss their findings and submit a report presenting the results, analyses, interpretations, conclusions, and appropriate solutions.

10. Evaluation methods

- Daily, monthly, and final theoretical and practical examinations.
- Project discussion.
- Seminars and reports.
- Summer training.
- Practical examinations.

Coursework contributes 40% and the final examination contributes 60%. Grades are distributed according to the adopted teaching system, whether the course system or the Bologna Process, and according to the number of units assigned to each course, while taking into account whether a practical laboratory component is present.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skill (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Biology	Mycology			1	
Lecturer	Biology	Mycology			1	
Professor	Biology	Plant Tissue Culture			1	
Professor	Chemical Sciences	Organic Chemistry			1	
Professor	Biology	Ecology			1	
Professor	Biology	Environmental Pollution			3	
Assist. Professor	Biology	Environmental Pollution			3	
Lecturer	Biology	Environmental Pollution			2	
Assistant Lecturer	Biology	Environmental Pollution			2	
Assistant Lecturer	Biology	Air Pollution			1	
Professor	Biology	Plant Taxonomy and Ecology			1	
Assistant Lecturer	Biology	Plant Taxonomy and Ecology			1	
Assistant Professor	Biology	Insect Taxonomy			1	
Assistant Professor	Biology	Ecology and Diatom Taxonomy			1	
Assistant Professor	Biology	Ecology and Taxonomy of Algae			1	
Assistant Lecturer	Biology	Algae			1	
Assistant Professor	Biology	Molecular Environmental Biology			1	
Assistant Professor	Biology	Invertebrate Ecology			2	
Lecturer	Biology	Animal Ecology			1	
Assistant Lecturer	Biology	Aquatic Vertebrates			1	
Assistant Professor	Biology	Environmental Management / Aquatic Ecology			1	
Assistant Professor	Biology	Avian Ecology			1	
Assistant Professor	Biology	Phytoremediation			1	

Assistant Lecturer	Biology	Phytoremediation			1	
Assistant Professor	Biology	Biotechnology / Renewable Energy			1	
Assistant Lecturer	Biology	Biotechnology			1	
Assistant Lecturer	Biology	Environmental Technologies			3	
Assistant Lecturer	Biology	Water Quality			1	
Lecturer	Agricultural Sciences	Environmental Pollution			1	
Assistant Lecturer	Agricultural Sciences	Animal Production			1	
Assistant Lecturer	Computer Sciences	Semantic Web			1	
Assistant Professor	Physical Sciences	Remote Sensing			1	

Professional Development

Mentoring new faculty members

1. Faculty members must comply with official daily working hours.
2. Faculty members must adhere to lecture schedules, daily and monthly theoretical and practical examinations, and the proper conduct of the educational process.
3. The progress of lectures and the percentage of planned course content completed must be monitored.
4. Faculty members must fulfill duties assigned through different committees and temporary assignments.

Professional development of faculty members

1. Encourage new faculty members to join research groups and complete scientific research projects.
2. Support participation in conferences, seminars, workshops, and professional development courses.
3. Encourage new faculty members to participate in community-service and awareness activities, including activities related to renewable energy.
4. Promote scientific and research cooperation among government institutions, private companies, the university, and academic research centers in Iraq and advanced countries.
5. Encourage participation in continuing-education activities.

12. Acceptance Criterion

1. Central admission by the Ministry of Higher Education determines the students admitted to the College. The source document states "College of Science" in this item.
2. Students are distributed among the seven departments of the College of Science, University of Basrah, on the basis of competition according to overall grades and relevant comparative subjects.
3. The intake capacity planned for the Department of Ecology in the previous year was 100-150 students.

13. The most important sources of information about the program

1. The Department page on the website of the College of Science, University of Basrah.
2. Department of Ecology Guide.
3. Website of the Ministry of Higher Education and Scientific Research.

14. Program Development Plan

Development of the Department is based on several criteria:

1. Using the most recent scientific books.
2. Continuously reviewing planned and completed implementation of the program, including review of curriculum content by the Scientific Committee.
3. Preparing future development plans through specialized committees concerned with curricula, laboratories, and procurement.
4. Encouraging cooperation and academic twinning with international universities, and promoting exchange of expertise and reciprocal visits.

Program Skills Outline

				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Level 1	W101	Human Rights Principles	Basic									√			
	SP101	sport	Basic									√			
	D101	Arabic Literature	Basic									√			
	C100	General Geologist	Basic	√	√						√				
	A127	Calculators	Basic						√	√					
	R101	Calculus	Basic									√			
	R117	Statistics	Basic						√	√		√			
	P102	Properties of the material	Basic						√	√		√			
	K112	Organic Chemistry	Basic						√	√		√			
	K131	Analytical Chemistry	Basic		√	√		√	√	√		√			
	E101	General Biology	Basic	√	√	√		√	√	√		√			
	E102	Fundamental of Ecology	Basic	√	√	√		√	√	√		√	√		
	E110	Molecular Cell Biology	Basic						√	√		√			
	E111	Photography and nature	Basic					√	√	√		√			

Level 2	W201	Principles of Freedom and Democracy	Basic									√			
	C260	Calculator Applications	Basic									√			
	Ch240	Biochemistry	Basic						√	√		√			
	E202	Plant Taxonomy	Basic	√	√	√		√	√	√		√	√		
	E203	Plant ecology	Basic	√	√	√		√	√	√		√			
	E204	Animal Taxonomy	Basic	√	√			√	√	√		√	√		
	E205	Animal ecology	Basic	√	√	√		√		√		√			
	E206	Climate change	Basic	√	√	√		√	√	√	√	√	√		
	E207	Planktonic and Productivity	Basic	√	√	√		√	√	√		√	√		
	E208	Biodiversity and sustainable development	Basic		√	√			√	√	√	√			
	E 209	Microbiology	Basic		√	√			√	√	√	√	√		
	E 210	Environmental Chemistry	Basic	√	√	√		√		√		√	√		
	E 216	Environmental Geology	Basic							√	√		√		

Level 3	D301	English Literature	Basic							√	√		√		
	E 302	Marine ecology	Basic			√		√		√	√		√		
	E 303	Methods of separation and automated analysis	Basic		√	√		√		√	√		√		
	E 304	Wetland Ecology	Basic	√	√	√				√	√		√		
	E 305	Air pollution	Basic	√	√	√		√	√	√		√	√		
	E 306	Water and soil pollution	Basic	√	√	√		√	√	√		√	√		
	E310	Nature Reserves	Basic	√	√	√		√	√	√	√	√	√		
	E311	Freshwater & estuary environment	Basic	√	√	√		√	√	√	√	√	√		
	E314	Natural Resources & Energy Sources	Basic	√	√	√		√	√	√	√	√	√		
	E317	Environmental Modeling	Basic	√	√	√		√	√	√		√			
	E316	Environmental Survey and Maps	option		√	√		√	√	√	√		√		
	E333	Meteorology	option	√	√	√		√	√	√		√	√		
	E340	Environmental disasters	option			√		√	√	√	√	√			
	E343	Organic pollution	option	√	√	√		√	√	√		√			
	E347	Microbial contamination	option		√	√		√	√	√	√				
	E351	Water Treatment Technologies	option	√	√	√		√	√	√		√	√		
	E356	Aquatic plants	option			√		√		√	√	√	√		
	E370	Radioactive contamination	option			√		√		√	√	√			

Level 4	W 400	Environmental awareness	Basic	√	√	√		√	√	√	√	√			
	E401	Waste Treatment and Recycling	Basic	√	√	√		√	√	√	√		√		
	E402	Environmental Laws and Legislation	Basic	√	√	√		√	√	√	√	√	√		
	E405	Research Project	Basic	√	√	√		√	√	√	√	√	√		
	E410	Environmental physiology	Basic	√	√	√		√	√	√	√				
	E421	Ecotoxicology	Basic	√	√	√		√	√	√	√		√		
	E430	Molecular Environmental Biology	option	√	√	√		√	√	√	√	√	√		
	E436	Hydrological	option	√	√	√		√	√	√	√		√		
	E444	Environmental Impact Assessment	option	√	√	√		√	√	√	√		√		
	E450	Parasitizing plants and their environments	option	√	√	√		√	√	√	√	√			
	E452	Occupational Health and Safety	option	√	√	√		√	√	√	√	√	√		
	E456	Botanical Techniques	option	√	√	√		√	√	√	√	√	√		
	E465	Remote sensing and GIS	option	√	√	√		√	√	√	√		√		
	E476	Industrial pollutants	option	√	√	√		√	√	√	√				
	E487	Environmental Sanitation	option	√	√	√		√	√	√	√		√		

- Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

MODULE DESCRIPTION E110

1. Course name: Molecular cytology

2. Course code: E 110

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2026

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

7. Course supervisor name: Asst. Prof. Dr. Nassir Abdullah Hillo

8. Module aims

Course objectives

1. Developing a high level of ability to recognize the principles and fundamentals of molecular biology.
2. Learn about the structure of nucleic acids, gene expression, and the influence of the environment and its interaction with the genetic material.

3. Determine the extent of change to which different organisms are exposed as a result of exposure to various pollutants and variable environmental factors that lead to stable genetic mutations in the organism.
4. Adopting the molecular aspect in diagnosing different organisms.
5. Knowing the closeness between different organisms, the origin of living organisms, and tracking their migration method.

9. Learning and teaching strategies

Strategies

1. Learn the basics of molecular environmental biology.
2. identify the composition of the genetic material of living organisms and how to multiply, reproduce and translate them.
3. Learn about the different factors that affect the genetic material and cause mutations in living organisms.
4. Knowing the genetic fingerprint, how to molecularly diagnose living organisms, and knowing the relationships between them.
5. Knowledge of the genetic balance and the transmission of genes between living organisms.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Prokaryotic cells	Prokaryotic cells	The microscope	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	2. Eukaryotic cells	Eukaryotic cells	Prokaryotic cells	
3	2	3. Structures in all cells	Structures in all cells	Eukaryotic cells	
4	2	4. The endomembrane system	The endomembrane system	Cell division	
5	2	5. Carbohydrates	Carbohydrates	Transport	
6	2	6. Lipids	Lipids	Across Membranes	
7	2	7. Exam	Exam	Microtechniques for cellular preparation	
8	2	8. Nucleic acids	Nucleic acids	Exam	
9	2	9. DNA Synthesis	DNA Synthesis	DNA isolation	
10	2	10. DNA replication	DNA replication	RNA isolation	
11	2	11. Cells communication	Cells communication	Plasmids isolation	
				Electrophoresis	
				Genetic mutation	

12	2	12. Transport Across Membranes	Transport Across Membranes	The PCR Technique Exam	
13	2	13. The Cell Cycle and Cell Division	The Cell Cycle and Cell Division Exam		
14	2		OPEN DISCUSSION		
15	2	Exam			

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

Hartwell, L. H.; Goldberg, M. L.; Fischer, J. A. and Hood, L. (2018). Genetics: from genes to genomes, 6th edition. New York, NY: McGraw-Hill Education

Freedland, J. R.; Kirk, H. and Petersen, S. (2011). Molecular Ecology, 2nd Edition. John Wiley & Sons, Ltd.

MODULE DESCRIPTION E 202

1. Course name: plant taxonomy

2. Course code: E 202

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

7. Course supervisor name : Prof. Dr. Abdul-Ridha Akbar Alwan + Asst. Dr. Najlaa Hashim Adlane

8. Module aims

Course objectives

- 1- The student learns about the plant kingdom, its divisions, the distinction between these divisions, and the history of plant taxonomy.
- 2- The student gets to know the parts and types of plants in detail and uses scientific methods to name plants.
- 3- Knowledge of methods of reproduction, means of seed transmission, and types of plants that are tolerant to salt, drought, and heat in the Iraqi environment.

	4- Practical application using microscopes and anatomical tools to identify the shapes and types of plants and their reproductive parts. 5- Increasing the student's ability to know the distinctive characteristics of plants and referring them to their plant families through the use of the taxonomic key for plant families in Iraq (parallel or digital Bracketed key). 6- Knowing the harms and benefits of plant diversity in different environments and how to harness it for human benefit
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9. Learning and teaching strategies

Strategies	Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Case studies and problem-based learning for practical applications. 4. Fieldwork and outdoor activities to observe ecosystems firsthand. 5. Laboratory work for hands-on experiments and data analysis. 6. Group projects and collaborative learning to foster teamwork and diverse perspectives. 7. Integration of multimedia resources and technology for interactive learning.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Identify the distinctive characteristics of plants in the Iraqi environment.	1- General plant classification, with terminology for plant organs and their description.	1. Practical identification of the major groups of plant kingdom classification.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	2. Identify the uses of scientific nomenclature for plants and their local names.	2- Flowering plants: General notes and how to use anatomical microscopes.	2. Practical identification of plant parts.	
3	2	3. By knowing the characteristics	3- Terminology for plant organs: Types of stems	3. The ability to communicate information after observation	
4	2				
5	2				
6	2				
7	2				
8	2				
9	2				
10	2				

11	2	of plants and their parts, students can easily trace them to their plant families.	and leaves.	and data collection.	
12	2		4- Types of flowers and flower parts.	4. Linking information to environmental conditions and their impact on plants.	
13	2		5- Types of inflorescences.		
14	2	4. Know how to use taxonomic keys for Iraqi plants. factors on the presence of microorganisms in the environment	6- Types of fruits.		
15	2	5. Knowing the environmental role played by microorganisms in different environments	7- Diagnosis: Diagnosis requirements, diagnostic methods, and use of the taxonomic key for plant families (parallel or digital key).		
			8- Dicotyledonous plant families. Dicotyledonous plant families.		
			9- Herbariums: their importance and how to prepare dried specimens.		

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	.Abdul-Ridha Akbar Alwan (2001). Modern Plant Taxonomy, University of Basra - Taiz University.
	Ali Hussein Issa (1987). Plant Taxonomy, University of Baghdad
	https://www.uoanbar.edu.iq/WomenEducationCollege/catalog/%D8%AA%D8%B5%D9%86%D9%8A%D9%81-%D8%A7%D9%84%D9%86%D8%A8%D8%A7%D8%AA.pdf

MODULE DESCRIPTION - E 207

1. Course name: Plankton and productivity

2. Course code: E 207

3. Semester/year: First semester 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

**7. Course supervisor name : Assist.Prof. Dr. Maitham Abdullah Ghaley
Dr. Ebtehal Mosa Jafer**

8. Module aims

Course objectives

1. Identify the main groups and types of phytoplankton.
2. Identify the main groups and types of zooplankton.
3. Understand the ecological and economic importance of plankton.
4. Understand the environmental conditions that affect their growth and prosperity and their relationship with each other.
5. Measure the primary and secondary productivity of phytoplankton and zooplankton.

	6. Understand the environmental conditions that affect primary productivity. 7. Be able to recognize the health of an ecosystem through biodiversity and the productivity of living organisms. 8. Understand the ecological role played by plankton in different environments. 9. Understand the harms and benefits of the presence of plankton in different environments and how to utilize them for human benefit.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Case studies and problem-based learning for practical applications. 4. Fieldwork and outdoor activities to directly observe ecosystems and collect environmental samples. 5. Laboratory work to conduct classification, quantitative and qualitative studies, and analyze data. 6. Group projects and collaborative learning to foster teamwork and diversity of perspectives.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Identify the main groups and types of phytoplankton.	Introduction to plankton, their general characteristics,	1. Practical identification of the major groups of microscopic phytoplankton and microzooplankton.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	2. Identify the main groups and types of zooplankton.	properties, ecological classifications, benefits, and harms.	2. Practical identification of the role of microplankton in the environment.	
3	2	3. Understand the ecological and economic importance of plankton.	Phytoplankton, cyanobacteria, green algae, euglena, and protists.	3. Ability to communicate information after monitoring and data collection.	
4	2	4. Understand the environmental conditions that affect their growth and prosperity and their relationship with each other.	Bacilli, yellow, and golden algae.	4. Link information to environmental realities and its impact on other	
5	2	5. Measure the primary and secondary productivity of phytoplankton and zooplankton.	Collecting, preserving, and counting zooplankton.		
6	2	6. Understand the environmental conditions that affect primary productivity.			
7	2	7. Be able to recognize the health			
8	2				
9	2				
10	2				
11	2				
12	2				
13	2				
14	2				
15	2				

		of an ecosystem through biodiversity and the productivity of living organisms. 8. Understand the ecological role played by plankton in different environments. Understand the harms and benefits of the presence of plankton in different environments and how to utilize them for human benefit. environmental factors on the presence of microorganisms in the environment 5. Knowing the environmental role played by microorganisms in different environments	Protozoa, cnidarians, comb-forming algae. Rotifera, nematodes, crustaceans. Cordochordates, hyphae. Adaptions for living in the aquatic environment: buoyancy, defense, and concealment. Feeding methods and means. Effects of environmental factors on plankton. Relationship between phytoplankton and zooplankton. Methods for measuring primary and secondary productivity in plankton.	organisms.	
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11. Course evaluation

Daily, monthly and final tests, practical tests, follow-up of laboratory reports and drawings of models and microscopic slides

12. Learning and teaching resources

	*Marine planktology. Zheng Zhong et al, 1989 *Phycology, Lee, (2008). *Ecology of Phytoplankton. C. S. Reynolds, (2006). *Plankton, A guide to their ecology and monitoring
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	for water quality, Iain M. Suthers and David Rissik, (2009).
	*Freshwater algae of North America, ecology and classification. Wehr and Sheath, (2003). *Freshwater algae, identification and use as bioindicators,. Bellinger and Sigee, (2010). *Identification Handbook of Freshwater Zooplankton of the Mekong River and its Tributaries, (2015).
	www.plankton.net www.epa.gov

MODULE DESCRIPTION E 206

1. Course name: Climate Changes

2. Course code: E 206

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name: Dr. Dheyaa Abdulsada Hussein

8. Module aims

Course objectives

1. Increasing the student's ability to identify the components of the climate system.
2. Identify the relationship between the components of the climate system.
3. Identify the role of the atmosphere in the climate changes
4. Identify the global climate changes before and after the industrial revolution.
5. Identify the processes in the climate system including the

atmospheric and ocean circulations and Hydrologic cycle.
6. Identify the Carbon cycle in the climate system.

9. Learning and teaching strategies

Strategies

1. Lectures and multimedia presentations to deliver foundational knowledge.
2. Interactive discussions and debates to encourage critical thinking.
3. Group projects and collaborative learning to foster teamwork and diverse perspectives.
4. Integration of multimedia resources and technology for interactive learning.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Understanding the interrelationship and influences between the components of the climate system.	1. Introduction & Climate System: Earth's atmosphere and climate components.	1. Lectures and readings.	Exams: 60 Quiz: 10 Homework: 10 Attendance: 10 Report: 10 Total: 100
2	2	2. Knowledge the natural and human causes that lead to climate changes.	2. Climate Change Observations: atmosphere, cryosphere, oceans, biosphere, and carbon cycle.	2. Data analysis and case studies.	
3	2	3. Understanding how human activities cause global warming.	3. Climate Change Theories: electromagnetic radiation, greenhouse effect, radiative forcings, feedbacks, and climate sensitivity.	3. Fieldwork and observations.	
4	2	4. Knowledge the theories that explain global warming.	4. Carbon Cycle: natural and anthropogenic.	4. Group projects and discussions.	
5	2	5. Knowledge how global warming affects climate change.	5. Circulation & Cycles: atmospheric circulation, three-cell model, hydrologic cycle, and ocean circulation.	5. Technology use (satellite data, simulations).	
6	2	6. Knowledge the factors that determine the level of global warming.		6. Research and self-study.	
7	2				
8	2				
9	2				
10	2				
11	2				
12	2				
13	2				
14	2				
15	2				

11. Course evaluation

Tests, project discussion

12. Learning and teaching resources

	1- Introduction to Climate Science (Andreas Schmittner, 2020)
	1- Essentials of Meteorology (C. Donald Ahrens)

MODULE DESCRIPTION E 204

1. Course name: Animal Taxonomy

2. Course code: E 204

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

**7. Course supervisor name: Ass.Pro.Dr. Muhana Kassim Habeeb
Ass.Pro.Dr. Raghd Zaidan Khalaf**

8. Module aims

Course objectives

Students will understand the following:

1. Classification is the arrangement of objects, ideas, or information into groups, the members of which have one or more characteristics in common.
2. Classification makes things easier to find, identify, and study.
3. Scientific classification groups all animals on the basis of

- certain characteristics they have in common.
4. Scientific classification uses Latin and Greek words to give each animal two names (similar to a first and last name) that identify the animal.

9. Learning and teaching strategies

Strategies

1. Lectures and multimedia presentations to deliver foundational knowledge.
2. Interactive discussions and debates to encourage critical thinking.
3. Group projects and collaborative learning to foster teamwork and diverse perspectives.
- 4-Integration of multimedia resources and technology for interactive learning.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Gain experience in taxonomy. 2. Understanding species and characteristics of the fauna. 3. Gain experience in species identification. 4. Learn how to name animals and put them into taxonomic groups. 5. Gain the skill in identifying animals in their natural habitats.	1. Introduction in Taxonomy:	1-Gain experience in taxonomy. 2. Understand animal species and their characteristics. 3. Gain experience in identifying species. 4. Learn how to name and classify animals into taxonomic groups. 5. Gain the skill of identifying animals in their natural environments.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2		2. Definition and scope of Taxonomy.		
3	2		3. Historical stages of Taxonomy.		
4	2		4. Importance of Taxonomy.		
5	2		5. Fields of Taxonomy.		
6	2		6. Classification systems.		
7	2		7. Classification Concepts and Principles:		
8	2		8. Scientific binomial nomenclature.		
9	2		9. Rules for writing scientific name.		
10	2		10. Main taxon.		
11	2		11. Classification of living Organisms:		
12	2		12. Kingdom Eubacteria.		
13	2		13. Kingdom Archaeobacteria.		
14	2		14. Kingdom Protista.		
15	2		15. Kingdom Fungi.		

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|--|--|--|---|--|--|
| | | | <p>16. Kingdom Plantae.</p> <p>17. Kingdom Animalia.</p> <p>18. Classification of Kingdom Animalia.</p> <p>19. Invertebrates:</p> <p>20. Importance of invertebrates.</p> <p>21. General characteristics.</p> <p>22. Classification of subkingdom Protozoa.</p> <p>23. Classification of Phylum porifera.</p> <p>24. Classification of Phylum Coelenterata or Cnidaria.</p> <p>25. Classification of Phylum Platyhelminthes.</p> <p>26. Classification of Phylum Rotifera.</p> <p>27. Classification of Phylum Annelida.</p> <p>28. Classification of Phylum Arthropoda.</p> <p>29. Classification of Phylum Mollusca.</p> <p>30. Classification of Phylum Achenodermata.</p> <p>31. Vertebrates:</p> <p>32. General characteristics.</p> <p>33. Classification of prochordata.</p> <p>34. Classification of Subphylum Agnatha</p> <p>35. Classification of Subphylum Gnathostomata.</p> <p>36. Classification of Fish.</p> <p>37. Classification of Amphibians.</p> <p>38. Classification of Reptiles.</p> <p>39. Classification of Birds.</p> | | |
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			40. Classification of Mammals.		
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11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

The basics of comparative anatomy of the chordates, written by Shukri Habib Khalil and Abdel-Zahra Kazem Muhammad - Salah al-Din University 1985	Zoology.Author, Stephen A. Miller & John P. Harley, Vol. 5, 2001
Invertebrates. Written by Zuhair Muhammad Abdullah Al-Sharuk - University of Mosul 1989	General zoology. Fourteenth addition,2005.Author,Charles F.Lytle&John R.Meyer.
The life of invertebrates. Translated by Salman Daoud Salman, Yahya Thomas Daoud and Balsam Anis Hanna - University of Basra 2016	Principles of Animal Taxonomy. Author,Ashok Verma . 2015
Biology of the invertebrates.Author,Cleveland P.Hichman.1973	

MODULE DESCRIPTION

1. Course name: Wetland Ecology

2. Course code: E 304

3. Semester/year: 2026-2025

4. Date of description preparation: 11/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

7. Course supervisor name: Lecturer Dr. Adil Fadil Abbas

8. Module aims

Course objectives

- 1- Knowing the different scientific and administrative definitions of wetlands
- 2- Knowing the general characteristics of wetlands and their distinguishing features.
- 3- Knowledge of wetland water science, its sources, and its importance to wetlands.
- 4- Knowing the soils of wetlands, their types and distinctive characteristics

	5- Study of the biochemical cycling of the most important nutrients in wetlands 6 - Identify the different biological groups in the wetlands.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Case studies and problem-based learning for practical applications. 4. Fieldwork and outdoor activities to observe ecosystems firsthand. 5. Laboratory work for hands-on experiments and data analysis. 6. Group projects and collaborative learning to foster teamwork and diverse perspectives. 7. Integration of multimedia resources and technology for interactive learning.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2		Introduction to wetland		
2	2		Definitions of wetlands.		
3	2	Introduction to wetland	Difficulty of Defining Wetlands	Types of wetlands	
4	2	The Wetland	Wetlands in the Landscape.	How to diagnose wetlands in the field	
5	2	Environment	Distinguishing Features of Wetlands.	wetland components	
6	2	Wetland Biogeochemistry	Presence of wetlands in the world	Wetland hydrology	
7	2	Biota in wetlands	The Wetland	Field trip 1	Exams: 60
8	2	Plants	Environment:	Wetland soil	Comprehension: 10
9	2	Wetland Invertebrate	Wetland Hydrology	Exam 1	Participation: 10
10	2	Wetland fishes	The Importance of Hydrology in Wetlands.	Wetland plants	Attendance: 10
11	2	Aquatic reptile and Amphibian	The influence of biotic factors on the hydrology of wetlands.	Wetland Invertebrates	Feld work: 10
12	2	Birds of wetland	Wetland Hydroperiod	Wetland fish	Total: 100
13	2	Mammals of wetland	Effects of hydrology on wetland functions.	Herpetofauna of wetland	
14	2	Wetland functions and values	Wetland Biogeochemistry:	Wetland Birds	
15	2	microorganisms in the environment	Nutrient	Field trip 2	
		5.Knowing the environmental role played by microorganisms in different environments	Carbon cycle (Fermentation,	Wetland mammals	
				Exam 2	

			Methanogenesis, Methane Oxidation) Nitrogen cycle (Nitrogen fixation, Ammonium Transformations and Nitrification Ammonium Transformations and Nitrification) Phosphorus Cycle. Sulfur cycle (Sulfate Reduction, Sulfide Oxidation, Sulfide Toxicity) Biota in wetlands: Microorganisms (Bacteria, Fungi, Algae) Plants Vascular plant adaptations to waterlogging Morphological adaptations (Aerenchyma, Adventitious Roots, Stem Hypertrophy, Stem Elongation, Root Adaptations, and Lenticels, Pneumatophores). Wetland Invertebrate Wetland Hydrology and Invertebrates Aquatic insects Respiration in Aquatic Insects (aeropneusty, hydropneusty) Wetland fishes: aquatic surface respiration Air-breathing Lung fish Aquatic reptile and Amphibian Birds of wetland The importance of wetlands for birds The effect of wetlands on waterbirds populations Mammals of wetland		
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			Wetland functions and values Wetland classification		
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11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	Biotopes of Iraqi Marshlands Proph. Najah A. Hussain
	wetland ecology , principles and conservation second edition. paul a. keddy.(2010) ..
	wetlands . fifth edition. william j. mitsch, james g. gosselink(2015) .
	Wetland indicators, a guide to wetland formation, identification, delineation, classification, and mapping. second edition.ralph w. tiner(2017).

MODULE DESCRIPTION E 209

1. Course name: Marine Ecology

2. Course code: E 302

3. Semester/year: 2026-2025

4. Date of description preparation: 11/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

7. Course supervisor name : Dr. Anfas N. Okash

8. Module aims

Course objectives

1. The origin of the Earth, how it was created, and how the oceans were formed
2. Division of neritic and oceanic zones
3. The nature of the Abyssal plain in different oceans and the ridges and plateaus it contains.
4. Marine currents and the Coriolis effect.

5. The impact of oceans on the temperature of the Earth and the heat budget
6. The Global conveyor belt and how it is forming.
7. The El Nino and the La Nina, and how they form.
8. The photic zone and assessing the productivity of oceans at different levels.
9. Endangered marine species and the main causes of the decline in diversity in the seas

9. Learning and teaching strategies

Strategies

1. Lectures and multimedia presentations to deliver foundational knowledge.
2. Interactive discussions and debates to encourage critical thinking.
3. Case studies and problem-based learning for practical applications.
4. Fieldwork and outdoor activities to observe ecosystems firsthand.
5. Laboratory work for hands-on experiments and data analysis.
6. Group projects and collaborative learning to foster teamwork and diverse perspectives.
7. Integration of multimedia resources and technology for interactive learning.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Understanding how the Earth was formed in general and the continents and oceans in particular. 2. Understanding trade winds and their effect on ocean currents and	Introduction to Oceanography.	Introduction to the seashore. Water temperature. Light and photic zone. Turbidity. Estimation of water currents.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2		Extensions and depths of the oceans.		
3	2		Neritic and oceanic zone.		
4	2		Ocean currents and the Coriolis effect.		
5	2		El Nino and La Nina.		
6	2				
7	2				
8	2				
9	2				

10	2	the extremes that occur in these currents.	Monsoon's current.	Estimation of Carbon Dioxide.	
11	2		Eddies and meddies.	Nutrients in marine water.	
12	2		Subsurface and bottom currents.	Fieldwork on a ship.	
13	2	3. Understanding the nature of the deep seas and how life can be found there.	The physical properties of water.	Life in oceans.	
14	2	4. Learn how organisms resist the pressure of the water column to live in the depths.	Chemical properties of seas.	Adaptation to planktonic life in oceans.	
15	2	5. Understanding the distribution of productivity between the seas, the reasons for the difference in productivity, and the most productive regions in the world.	Marine biology. Oceanic productivity. Factors affecting productivity.	Adaptation to Benthic life in oceans. The nature of Iraqi shore.	

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	Practical handbook of Marine science (Michael J. Kennish,2001)
	Lecture notes in physical Oceanography (Odd Henrik Saelen and Eyvind Aas 2012)

MODULE DESCRIPTION E 310

1. Course name: Natural Reserves

2. Course code: E 310

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name : Ass.Pro.Dr. Muhana Kassim Habeeb

8. Module aims

Course objectives

Students will understand the following:

- 1- Maintaining and monitoring balanced natural environmental processes and relationships**
- 2- Preserving and preserving plant and animal species and genetic resources.**
- 3- The organized and rational economic exploitation of these vital resources that may arise in these reserves.**

	4- Nature reserves are important sites for raising awareness of the need to preserve biodiversity and ecosystems. 5- Rehabilitation of extinct species, which are found in other similar sites, and re-development and rehabilitation of endangered and rare species. 6- Develop ecotourism, especially after it has become the first competitor to archaeological and historical sites in a way that does not affect the safety of these reserves from deterioration and decline.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Group projects and collaborative learning to foster teamwork and diverse perspectives. 4. Integration of multimedia resources and technology for interactive learning.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Identify the types of nature reserves. 2. Select the appropriate area for establishing the nature reserve. 3. Determine the objectives. 4. Map the selected area. 5. Collect and analyze data.	introduction - nature reserves	Students will learn to communicate successfully in a variety of contexts. 1- They will learn how to work successfully in wildlife conservation. 2- They will be able to identify and	Exams: 80 Comprehension: 10 Participation: 7 Attendance: 3 Total: 100
2	2		Types of nature reserves		
3	2		The importance of nature reserves		
4	2		The role of nature reserves in protecting the environment		
5	2		The role of nature reserves in protecting the biodiversity		
6	2		The role of nature reserves in preserving the ecological balance		
7	2		The role of nature reserves in achieving sustainable development		
8	2		Methods to cause changes in ecosystem		
9	2		Mechanisms for		
10	2				
11	2				
12	2				

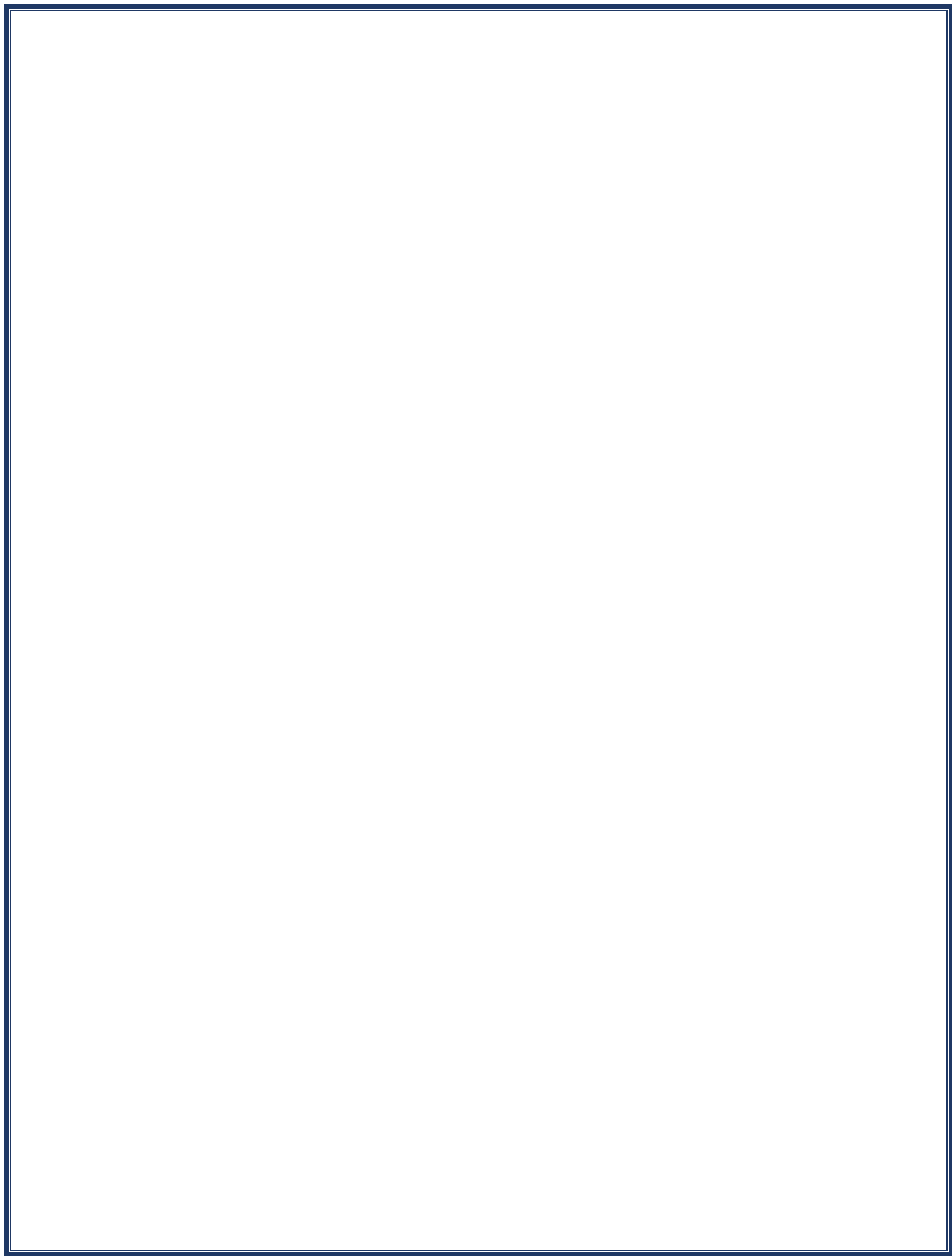
13	2		establishing nature reserves	adapt to key roles within a multicultural team.	
14	2		Administrative control for the protection of nature reserves		
15	2		Eco-tourism concept	3- They will learn to work on projects with international partners to study environmental requirements.	
			Elements of Eco-tourism concept	4- They will be able to develop and implement an action plan at the national and international levels.	
			Red List Categories and Criteria		
			Extinct and endangered vertebrate animals in Iraq		

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

1- IUCN Red list Categories and Criteria (2000). Version 3.1 second edition. Gland, Switzerland.	2- BirdLife International (2020). Handbook of the Birds of the World and BirdLife International digital checklist of the birds of the world. Version 9.1. Available at: Taxonomy/BirdLife Checklist_Version_91.
3-Qader, Anwar Omar. (2017). Mechanisms for establishing and protecting nature reserves. Yad Press.	4- Guidelines for applying the IUCN Red List Criteria at the Regional and National Levels (2010). Version 4.0 IUCN Species Survival Commission.



MODULE DESCRIPTION E 314

1. Course name: Natural Resources and Energy Sources

2. Course code: E 314

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name : Assis. prof. Dr. Sudad Asaad Mutashar

8. Module aims

Course objectives

- 1- Introduce students to the concept of natural and environmental resources and their economic and social importance.**
- 2- Classify natural resources according to renewable energy and the nature of their formation.**
- 3- Analyze environmental problems related to**

	resource depletion, pollution, global warming, desertification, wars, urban expansion, and natural factors. 4- Review mechanisms for conserving and developing natural resources within the framework of sustainable development. 5- Provide a detailed explanation of non-renewable energy sources (coal, oil, natural gas, nuclear energy) and renewable energy sources (solar, wind, water, geothermal energy, tidal energy, bioenergy). 6- Highlight the relationship between renewable energy and environmental protection, and its role in achieving sustainable development goals.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver essential knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Fieldwork and outdoor activities to directly observe ecosystems. 4. Group projects and collaborative learning to foster teamwork and diversity of perspectives.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1-Identify the types, characteristics, and classifications of natural resources and distinguish between renewable and non-renewable resources.	General Introduction	1. Present lecture content clearly and organized, explaining key points.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2		Environmental Natural Resources	2. Use visual aids such as images, graphics, and concept maps to clarify complex concepts.	
3	2		The importance of renewable energy in protecting the environment for sustainable development	3. Pose stimulating questions for	
4	2		Solar energy		
5	2		Wind energy		
6	2		Exam		
7	2	2- Analyze the environmental problems	hydroelectric		
8	2				

9	2	associated with	power	discussion that	
10	2	resource misuse	Geo thermal	contribute to	
11	2	such as pollution,	energy	arousing curiosity	
12	2	depletion,	Biomass energy	and encouraging	
13	2	desertification,	Ethanol and	critical thinking	
14	2	and global	bioethanol	about the topic of	
15	2	warming.	Microorganisms	energy resources.	
		3-Explain the	used in bioethanol	4. Divide students	
		principles and	production	into small groups to	
		types of renewable	Biodiesel	discuss specific	
		and non-	Extracting oils	topics such as	
		renewable energy,	from algae	resource types,	
		including solar,	Transesterification	energy sources, or	
		wind, hydro,	Open Discussion	the benefits of	
		geothermal,		clean, green energy.	
		biomass, and fossil		5- Organizing field	
		fuels.		visits to clean	
		4-Evaluate the		energy production	
		role of renewable		sites to learn about	
		energy in		practical processes.	
		achieving		6- Encouraging	
		environmental		students to pursue	
		sustainability and		energy production	
		supporting		experiments in	
		sustainable		their communities.	
		development			
		goals.			
		5-Compare			
		different			
		technologies used			
		in energy			
		production from			
		natural resources			
		and their			
		environmental			
		implications.			
		6-Assess strategies			
		and mechanisms			
		for the			
		conservation and			
		sustainable use of			
		natural resources.			
		7-Discuss the			
		concept of			
		sustainable			
		development, its			
		dimensions			
		(economic,			
		environmental,			
		social, and			
		technological),			

		and its relationship with energy use. 8-Understand the practical applications of renewable energy sources such as solar panels, wind turbines, hydropower plants, and biofuels.			
11. Course evaluation					
Tests, project discussion					
12. Learning and teaching resources					
1.Boyle, G. (Ed.). Renewable Energy: Power for a Sustainable Future. Oxford University Press.					
2.Smil, V. Energy: A Beginner's Guide. Oneworld Publications.					
3.World Bank Report (2022) – The Role of Natural Resources in Economic Development.					

MODULE DESCRIPTION E 333

1. Course name: Meteorology

2. Course code: E 333

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name: Dr. Dheyaa Abdulsada Hussein

8. Module aims

Course objectives

1. The student will identify the elements of weather and climate, such as temperature, atmospheric pressure, wind, and humidity.
2. The student will explain the mechanism of cloud and precipitation formation based on physical processes such as condensation and the dew point.
3. The student will distinguish between different types of clouds in terms of shape, height, and associated phenomena.
4. The student will use meteorological observational instruments

	(such as a thermometer, barometer, or hygrograph) to record weather elements. 5. The student will analyze simple weather maps to understand the geographical distribution of atmospheric systems and predict weather conditions. 6. The student will evaluate the impact of weather phenomena (such as heavy rain, strong winds, or drought) on human activities and the environment.

9. Learning and teaching strategies

Strategies

- 1. Brainstorming
To activate prior knowledge and stimulate thinking about weather phenomena.
- 2. Cooperative Learning (Team Learning):
By dividing students into groups to discuss topics such as cloud formation or map analysis.
- 3. Presentation:
Present weather information using slides, satellite images, and videos.
- 4. Interactive Lecture:
Explain theoretical concepts while incorporating questions and discussions during the presentation.
- 5. Problem-Based Learning:
Give students a weather scenario and encourage them to solve a problem such as "Why did a storm occur in a particular area?"
- 6. Multimedia Explanation:
Use animations or videos to explain complex concepts such as the movement of air masses.
- 7. Concept Mapping Strategy:
To help students connect concepts such as: "Humidity → Condensation → Clouds → Precipitation."
- 8. Open and Closed Classroom Questions:
To assess understanding and deepen thinking (e.g., "What is the difference between relative and absolute humidity?").
- 9. Project-based learning: Students are assigned to prepare a weather report for a specific area using real-world sources.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Define basic meteorological concepts (weather & climate).	1. Introduction to Meteorology: concept, atmosphere components, and layers.	1. Theoretical lectures 2. Practical training 3. Maps and climate data 4. Field visits 5. Self-learning 6. Discussions and problem-solving	Exams: 60 Quiz: 10 Homework: 10 Attendance: 10 Report: 10 Total: 100
2	2	2. Analyze atmospheric processes (condensation, evaporation, cloud formation).	2. Weather Elements: temperature, pressure, wind, humidity, and precipitation.		
3	2	3. Distinguish cloud types and related phenomena.	3. Atmospheric Processes: heat transfer, pressure systems, wind formation, humidity, and condensation.		
4	2	4. Interpret climate data and weather maps for prediction.	4. Clouds and Precipitation: types, classification, and formation mechanisms.		
5	2	5. Use instruments to measure weather elements.	5. Observation and Forecasting: instruments, weather maps, satellite and radar images.		
6	2	6. Evaluate impacts of weather and climate on human activities			
7	2				
8	2				
9	2				
10	2				
11	2				
12	2				
13	2				
14	2				
15	2				

11. Course evaluation

Tests, project discussion

12. Learning and teaching resources

1- Essentials of Meteorology (C. Donald Ahrens)

2- Introduction to Climate Science (Andreas Schmittner, 2020)

MODULE DESCRIPTION E 209

1. Course name: Environmental disasters

2. Course code: Eco 340

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name : Lect. Dr. Ebtehal Mussa Jaffer

8. Module aims

Course objectives

1. Knowing the types of environmental disasters
- 2- Understand how these disasters affect the ecosystem.
- 3- Identifying the role of government agencies and individuals to reduce the risks resulting from environmental disasters.
- 4- Knowing the impact of various environmental factors on the occurrence of disasters.

5- Knowing the impact of human activity on the types of disasters and the frequency of their occurrence.

9. Learning and teaching strategies

Strategies

1. Lectures and multimedia presentations to deliver foundational knowledge.
 2. Interactive discussions and debates to encourage critical thinking.
 3. Group projects and collaborative learning to foster teamwork and diverse perspectives.
- Integration of multimedia resources and technology for interactive learning.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1- Identifying the most prominent risks facing the environment	1-General Introduction Types of disasters.	Theoretical	Exams: 60 Comprehension: 10 Participation: 10 Report: 10 Attendance: 10 Total: 100
2	2	2- Identifying the most prominent local environmental disasters.	2-Classification of hazards and disasters.		
3	2	3- confrontation human activity on the types of disasters and prevent the frequency of their occurrence.	3-Types of natural disasters.		
4	2	4- Identify the types of industrial pollutants in the environment, their sources,	4-Earthquakes.		
5	2		5-Volcanoes.		
6	2		6- Forest Fire.		
7	2		7- Tsunami waves.		
8	2		8-Torrents.		
9	2		9-Flood.		
10	2		10-Desertification.		
11	2		11-Drought.		
12	2		12-Sandstorms.		
13	2		13-Tornadoes		
14	2		14- Geomorphological disasters.		
15	2				

		and how to treat them before and after they are released to the environment	15- Crisis management		
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11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	1- Environment and Disaster Risk. Emerging Perspectives. UNEP (2008) 2- Environmental disasters in social context: toward a preventive and precautionary approach Kenneth Hewitt (2012)
	3-Assessment of drought vulnerability based on the soil moisture. Yoo et al (2006)
	4- Drought and drought tolerance. J. B. Passioura (1996)

MODULE DESCRIPTION E 401

1. Course name: Waste treatment and recycling

2. Course code: E 401

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name : Assis. prof. Dr. Sudad Asaad Mutashar

8. Module aims

Course objectives

- 1. To provide students with basic knowledge of waste management in the environment.**
- 2. To understand how waste affects different environments and how they are affected by them.**
- 3. To understand the role of humans in waste management in different environments.**

4. To understand the impact of different environmental factors on the presence of waste in the environment.
5. To understand the environmental role played by waste in different environments and its effects on humans and health.
6. Knowing the negatives and positives of the role of waste management in different environments and how to harness it for human benefit.

9. Learning and teaching strategies

Strategies

1. Lectures and multimedia presentations to deliver foundational knowledge.
2. Interactive discussions and debates to encourage critical thinking.
3. Case studies and problem-based learning for practical applications.
4. Fieldwork and outdoor activities to directly observe ecosystems.
5. Group projects and collaborative learning to foster teamwork and diversity of perspectives.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1-Understand the concept of solid waste, its various types, and its risks to the environment and human health. 2-Understand the causes of waste growth and its spread in various communities. 3-Identify the components and composition of solid waste and its physical and	General Introduction	1- Present lecture content clearly and organized, explaining key points.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2		Main Types of Solid Waste in the Environment	2- Use visual aids such as images, graphics, and concept maps to illustrate complex concepts.	
3	2		Hazardous Waste in the Environment	3- Pose stimulating discussion questions that contribute to arousing curiosity	
4	2		Learning About Waste Management		
5	2		Waste Treatment and Recycling		
6	2				
7	2				
8	2				
9	2				
10	2				

11	2	chemical impact on treatment and disposal options.	Methods	and encouraging	
12	2		Pros and	critical thinking	
13	2	4-Explain the harmful effects of solid waste	Cons of	about the topic of	
14	2	accumulation on soil, water, air, and public health.	Treatment	waste management.	
15	2	5-Evaluate traditional and modern solid waste disposal methods.	Methods	4- Divide students into small groups to discuss specific topics such as waste types, treatment methods, or the benefits of recycling.	
		6-Evaluate traditional and modern solid waste disposal methods, and explain the advantages and disadvantages of each method.	Compost	5- Holding practical workshops to apply waste recycling concepts such as analysis, sorting, or composting.	
		7-Explain the compost production process.	Production	6- Organizing field visits to waste collection sites or recycling centers to learn about the processes in action.	
		8-Understand the concept of recycling, its environmental and economic importance, and the types of recyclable waste.	Paper, Glass, and Metal	7- Encouraging students to follow up on recycling projects in their communities.	
		9-Learn about biogas utilization techniques, including its definition, components, production stages, influencing factors, and various uses.	Management		
		10-Develop students' thinking and analytical skills in evaluating the feasibility and effectiveness of	Methods		
			Plastic		
			Recycling		
			Biogas		
			Production from Organic Waste		

		waste treatment and recycling methods, and the ability to propose sustainable solutions that reduce the impact of waste on the environment.			
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11. Course evaluation

Tests, project discussion

12. Learning and teaching resources

1- Environmental engineering, sixth edition edited by nelson l. nemerow, franklin j. agardy, patrick sullivan, and joseph a. salvato (2009).

2- Abdel-Shafy, H. I., & Mansour, M. S. (2018). Solid waste issue: Sources, composition, disposal, recycling, and valorization. *Egyptian journal of petroleum*, 27(4), 1275-1290.

3- Muhsin, Z. A. A., Jihad, G. H., & Mohammed, N. U. G. (2024). Recycling Waste in Biological Methods and Physical Treatment. *Wasit Journal for Pure sciences*, 3(3), 121-134.

4- Abubakar, I. R., Maniruzzaman, K. M., Dano, U. L., AlShihri, F. S., AlShammari, M. S., Ahmed, S. M. S., & Alrawaf, T. I. (2022). Environmental sustainability impacts of solid waste management practices in the global South. *International journal of environmental research and public health*, 19(19), 12717.

MODULE DESCRIPTION E 402

1. Course name: Environmental laws and legislation

2. Course code: E 402

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name: Lecturer Enas A. Mahdi Al-Nabhan

8. Module aims

Course objectives

1. The course aims to introduce students to the meaning of legal and environmental terminology and how to establish connections between the two.
2. It aims to provide an understanding of the legal sources used in drafting environmental legislation.
3. To familiarize students with international organizations and agreements related to environmental issues, along with the

	objectives of each organization and agreement. 4. To provide information about the Iraqi Ministry of Environment and its key roles and responsibilities regarding water, air, soil, and biodiversity. 5. To understand the main penalties and legal procedures applied to violators under Iraqi law.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Group projects and collaborative learning to foster teamwork and diverse perspectives. 4. Integration of multimedia resources and technology for interactive learning.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	• Enable the student to understand environmental problems and their relationship with legal terminology.	1. General Introduction	• Lectures and multimedia presentations to deliver foundational knowledge. • Interactive discussions and debates to enhance critical thinking. • Assignments to encourage students to learn how to create PowerPoint presentations	Exams: 30 Comprehension: and Participation: 5 Attendance: 5 Total: 40 and final exam : 60
2	2		2. The Meaning of International Law, the Concept of Legislation, and the Role of Civil Society in Environmental Protection		
3	2		3. Organizations Specialized in Environmental Protection: Their Roles, Activities, and Objectives		
4	2		4. The Concept of Environmental Damage and Environmental Crime, and Their Forms		
5	2				
6	2				
7	2				
8	2	• Ensure the student recognizes the importance of the objectives of each organization and agreement studied.			
9	2				
10	2				
11	2	• Provide the student with			
12	2				
13	2				
14	2				
15	2				

		the necessary knowledge to participate as an environmental specialist in assisting legal professionals in drafting laws. • Encourage the student's contribution to solving environmental problems and raising awareness about the importance of environmental protection. • Raise awareness of the role of international organizations and civil society in educating the public, factory owners, and small business owners about the need to avoid environmental violations and the potential legal consequences.	5. International Agreements for the Protection of the Aquatic Environment 6. International Agreements for the Protection of the Air 7. International Agreements for the Conservation of Biodiversity 8. Environmental Protection in Iraqi Legislation: The Role of the Ministry of Environment and the Elements Covered by Protection 9. Management of Hazardous Waste under Iraqi Law 10. Punitive Provisions under Iraqi Law 11. Penalties Enforced by Iraqi Law for Violators of the Environmental Protection Law 12. International Agreements to Which Iraq is a Party 13. IUCN Classifications of Protected Areas, the Roles of the Community and Government, and Their Main Objectives in	on specific topics and practice effective delivery.	
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			Environmental Protection 14. Open Lecture for Discussion on What You Have Learned During the Course 15. Open Discussions and Seminars for Students		
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11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	1. Environmental Law – General Theory of Environmental Law with Explanation of Environmental Legislation, Dr. Abdel Nasser Ziyad Hayajno, Dar Al-Thaqafa, Cairo, 2014.
	2. Environmental Crime, Hassam Mohamed Sami Jaber, Dar Al-Kutub Al-Qanuniya, Egypt, 2012.
	Iraqi Environmental Protection and Improvement Law, No. (17) of 2009.

MODULE DESCRIPTION E 410

1. Course name: Ecophysiology

2. Course code: E 410

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

**7. Course supervisor name: Assis. Prof. Dr. Shurooq Abdulah Najim/
Lecturer.Dr. Njlaa Hashim Adlan**

8. Module aims

Course objectives

1. To understand how plants, acquire and utilize resources such as light, water, and nutrients.
2. To explore plant responses to environmental stresses like drought, salinity, and temperature extremes.
3. To examine plant adaptations to various habitats and their role in ecosystem functioning.

	4. To investigate the physiological mechanisms underlying plant growth, development, and reproduction. 5. To explore physiological mechanisms in animals and their interactions with the environment. 6. To understand how animals, adaptation to various habitats through physiological processes. 7. To investigate the impact of environmental changes on animal physiology. 8. To develop skills in experimental design and data analysis in animal physiology.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Case studies and problem-based learning for practical applications. 4. Fieldwork and outdoor activities to observe ecosystems firsthand
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10. Course structure

Week	Hours	Topics	Module Learning Outcomes	Learning method	Evaluation method
1	2	Theoretical: Introduction to ecophysiology	1. Defining ecophysiology and its relationship with other sciences such as evolutionary biology and comparative anatomy. 2. Understanding the effect of temperature on physiological processes in both plants and animals. 3. Understanding the effect of osmosis on living organisms and the applications of this phenomenon in both plants and animals.	1. Practical identification of environmental factors affecting the physiology, presence, and distribution of living organisms. 2. Ability to communicate information after observation and data collection.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	Thermal Ranges of Living Organisms			
3	2	Causes of Thermal Death in Living Organisms			
4	2	Cold-Induced Mortality and Cold Resistance			
5	2	Thermophilic Organisms and Mechanisms of High-Temperature Resistance			

6	2	Exam	4.Understanding the importance of oxygen as a limiting factor in different environments (aquatic and terrestrial). 5.Understanding the importance of light and its effects on both aquatic organisms and terrestrial animals.	3.Linking information to the environmental context and its impact on other organism	
7	2	Osmosis pressure			
8	2	Adaptation of marine and fresh water organism to the habitats.			
9	2	Respiratory Adaptations of Aquatic Organisms			
10	2	Bohr effect			
11	2	Oxygen and CO₂ EXCHANG			
12	2	Photosynthesis in plant and light and dark interactions.			
13	2	Effect of temperature degrees on plant growth			
14	2	Effect of salinity on plants			
15	2	Open discussion			

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11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

*HUMAN PHYSIOLOGY
 *ANIMAL ECOPHYSIOLOGY
 *INVERTEBRATE
 ECOPHYSIOLOGY
 *PLANT PHYSIOLOGY

MODULE DESCRIPTION E 421

1. Course name: Environmental Toxicology

2. Course code: E 421

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

7. Course supervisor name : Prof. Dr. Asia Fadhile Abdullah

8. Module aims

Course objectives

1. It is science that attempts to qualitatively identify all the hazards chemicals
2. Identify the main groups and types of toxic chemical.
3. Knowing the affecting of this chemical on human health.
4. Knowing the environmental conditions affecting and relationship with toxic chemicals.

5. Knowing the Chemical Carcinogenesis and Mutagenesis.
6. Airborne particles was extended to include most recent study on toxicity of particles will effects of atmospheric changes on human health.

9. Learning and teaching strategies

Strategies

1. Lectures and multimedia presentations to deliver foundational knowledge.
2. Interactive discussions and debates to encourage critical thinking.
3. Case studies and problem-based learning for practical applications.
4. Fieldwork and outdoor activities to observe ecosystems firsthand.
5. Laboratory work for hands-on experiments and data analysis.
6. Group projects and collaborative learning to foster teamwork and diverse perspectives.
7. Integration of multimedia resources and technology for interactive learning.
8. The student's ability to identify the sources of chemicals in the air, water, soil, images and forms in which these materials are present in these environments and their interactions, transformations and effects on the living and the ultimate destiny of these materials in the environment. And cycles of some important and essential elements of biology and the environment

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Understanding the interrelationship and influences between the components of the chemicals and human health. 2. Knowledge	Theoretical: Introduction in Environmental Toxicology Toxicology Interaction of toxic chemicals Dose –	Introduction and definitions in environmental toxicology and exposure routes Using living organisms as an indicator	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2				
3	2				
4	2				
5	2				
6	2				
7	2				

8	2	the natural and xenobiotic chemicals causes' disease on health.	Response	of	
9	2		Mode of Entry	environmental	
10	2		of Toxins	pollution and	
11	2	3.	Exam	the most	
12	2	Understanding	Digestive	important	
13	2	how	System Route	characteristics	
14	2	carcinogenesis	Carcinogenesis	that must be	
15	2	chemical cause cancer.	and Cancer	present in a	
		4. Knowledge the main group of toxic chemical.	Exposure	biological	
		5. Knowledge how toxic chemical react with biological cells.	through the	indicator	
		6. Knowledge the different factors of effect on health with toxins.	skin	LC50 test and	
			Blood	factors	
			Kidneys	affecting the	
			Algal Toxins	test procedure	
			Animal toxins	How to	
			Plant Toxins	calculate	
			OPEN	LC50 using a	
			DISCUSSION	graph	
				Bacterial	
				toxins	
				Exam	
				Ppetroleum	
				aromatic	
				hydrocarbons	
				(PAHs)	
				Toxicity of	
				organic	
				solvents	
				Pesticides and	
				their	
				environmental	
				and health	
				risks	

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

ENVIRONMENTAL
TOXICOLOGY Second Edition
Biological and Health Effects
of Pollutants 2004

Basics of Environmental Toxicology	

MODULE DESCRIPTION E430

1. Course name: Molecular cytology

2. Course code: E 430

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

7. Course supervisor name: Asst. Prof. Dr. Nassir Abdullah Hillo

8. Module aims

Course objectives

1. Developing a high level of ability to recognize the principles and fundamentals of molecular biology.
2. Learn about the structure of nucleic acids, gene expression, and the influence of the environment and its interaction with the genetic material.

3. Determine the extent of change to which different organisms are exposed as a result of exposure to various pollutants and variable environmental factors that lead to stable genetic mutations in the organism.
4. Adopting the molecular aspect in diagnosing different organisms.
5. Knowing the closeness between different organisms, the origin of living organisms, and tracking their migration method.

9. Learning and teaching strategies

Strategies

1. Learn the basics of molecular environmental biology.
 2. identify the composition of the genetic material of living organisms and how to multiply, reproduce and translate them.
 3. Learn about the different factors that affect the genetic material and cause mutations in living organisms.
 4. Knowing the genetic fingerprint, how to molecularly diagnose living organisms, and knowing the relationships between them.
- Knowledge of the genetic balance and the transmission of genes between living organisms.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	Indicative content includes the following: 1. The chromosome structure 2. The nucleic acids structure 3. DNA replication 4. Transcription and Translation 5. The bacterial conjugation 6. The bacterial transformation 7. Exam	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Case studies and problem-based learning	The chromosome structure	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2			The nucleic acids structure	
3	2			DNA replication	
4	2			Transcription and Translation	
5	2			The bacterial conjugation	
6	2			The bacterial transformation	
7	2			Exam	
8	2			Transduction	
9	2				
10	2				
11	2				

12	2	8. Transduction	for practical	Mutation	
13	2	9. Mutation	applications.	Genetic	
14	2	10. Genetic	4. Fieldwork and	fingerprinting	
15	2	fingerprinting	outdoor	The genetic	
		11. The genetic drift	activities to	drift	
		12. The genetic Flow	observe	The genetic	
		13. Hardy-Weinberg	ecosystems	Flow	
		law of genetic	firsthand.	Hardy-	
		equilibrium	5. Laboratory	Weinberg law	
		Exam	work for hands-	of genetic	
			on experiments	equilibrium	
			and data	Exam	
			analysis.	OPEN	
			6. Group projects	DISCUSSION	
			and		
			collaborative		
			learning to		
			foster		
			teamwork and		
			diverse		
			perspectives.		
			7. Integration of		
			multimedia		
			resources and		
			technology for		
			interactive		
			learning.		
11. Course evaluation					
Tests, project discussion, practical tests					
12. Learning and teaching resources					
			Freedland, J. R.; Kirk, H. and Petersen, S. (2011). Molecular Ecology, 2nd Edition. John Wiley & Sons, Ltd.		
			Hartwell, L. H.; Goldberg, M. L.; Fischer, J. A. and Hood, L. (2018). Genetics: from genes to genomes, 6th edition. New York, NY: McGraw-Hill Education.		

MODULE DESCRIPTION E 436

1. Course name: Hydrology	
2. Course code: E 436	
3. Semester/year: 2026-2025	
4. Date of description preparation: 1/9/2025	
5. Available attendance forms: In-person	
6. Number of study hours (total): Number of units (total):30/2	
7. Course supervisor name : Assist. Prof. Dr. Mohammad Salim Moyel	
8. Module aims	
Course objectives	1- To introduce students to the fundamental concepts and principles of hydrology. 2- To explain the components and processes of the hydrological cycle. 3- To develop students' understanding of water movement in surface and subsurface environments. 4- To analyze the impact of hydrological processes on environmental systems and human society.

	To familiarize students with methods of measuring and analyzing hydrological data.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Group projects and collaborative learning to foster teamwork and diverse perspectives. 4. Integration of multimedia resources and technology for interactive learning.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Define key terms and concepts in hydrology.	Introduction to Hydrology	1. Present lecture content clearly and organized, explaining key points.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	2. Describe the main components of the hydrological cycle and their interactions.	The Hydrological Cycle	2. Use visual aids such as images, graphics, and concept maps to clarify complex concepts.	
3	2	3. Explain the processes of precipitation, evaporation, transpiration, infiltration, runoff, and groundwater flow.	Precipitation	3. Pose stimulating questions for discussion that contribute to arousing curiosity and encouraging critical thinking about the topic of hydrology.	
4	2	4. Analyze the factors affecting water movement in various environmental contexts.	Evaporation and Transpiration		
5	2	5. Interpret basic hydrological data and apply simple quantitative methods.	Infiltration and Soil Moisture		
6	2		Surface Runoff		
7	2		Factors influencing runoff and streamflow.		
8	2		River system hydrology		
9	2		Hydrological measurements of river basins		
10	2		Groundwater		
11	2		Hydrology		
12	2		Hydrological Measurement and Data Analysis		
13	2		Applications of Hydrology		
14	2		Hydrology in water resources		
15	2				

		6. Assess the significance of hydrology in environmental management and planning.	management Hydrological aspects of environmental problems (e.g., floods, droughts, pollution). Water balance concept.		
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11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	1- Hydrology and the Management of watersheds (Kenneth N. Brooks)
	2- Hydrology: An Introduction (Wilfried Brutsaert)

MODULE DESCRIPTION E 456

1. Course name: Phytoremediation

2. Course code: E 456

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/3

7. Course supervisor name : Prof. Dr. Asia Fadhile Abdullah

8. Module aims

Course objectives

1. Increasing the student's ability to understand the phytoremediation technique.
2. Identify the relationship between the components of the phytoremediation system as plants, bacteria and soil or water.
3. Identify the role of the plants in the phytoremediation
4. Identify the role of the plants interaction with different parameters in the phytoremediation

5. Identify the plants how can effect on the climate change.

9. Learning and teaching strategies

Strategies

1. Lectures and multimedia presentations to deliver foundational knowledge.
2. Interactive discussions and debates to encourage critical thinking.
3. Group projects and collaborative learning to foster teamwork and diverse perspectives.
4. Integration of multimedia resources and technology for interactive learning

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	Understand the interrelationship and influences between plants and various factors.	General Introduction Remediation Methods Environmental Technologies and Phytoremediation	Introduction to Phytoremediation	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	2. Understand how plants and bacteria interact to treat pollution.	Examples of Environmental Technology Applications	Selecting the best plants	
3	2	3. Understand how human activities cause pollution and how plants reduce it.	Benefits of Phytoremediation Exam One	Preparing solutions for heavy metals and petroleum hydrocarbons	
4	2	4. Understand the role of plants in purifying the air of pollutants.	Basics of Environmental Remediation	Propagating plants, preparing soil, and studying their properties	
5	2	5. Understand how phytoremediation alters water pollution.	Characteristics of Plants Selected for Remediation	Toxicity tests to determine optimal concentrations	
6	2	6. Understand the factors that determine pollution levels.	Aquatic Plants in Remediation		
7	2		Artificial Wetlands		
8	2		Free-Running Wetlands		
9	2		Horizontal Wetlands		
10	2		Vertical Wetlands		
11	2		Mixed Wetlands		
12	2				
13	2				
14	2				
15	2				

			Exam Two		
	11. Course evaluation				
	Tests, project discussion, practical tests				
	12. Learning and teaching resources				
	Review of Constructed Subsurface Flow vs. Surface Flow Wetlands				
	Introduction and Characteristics of Flow				

MODULE DESCRIPTION - E 487

1. Course name: Environmental sanitation

2. Course code: E 487

3. Semester/year: 2026-2025

4. Date of description preparation: 1/9/2025

5. Available attendance forms: In-person

6. Number of study hours (total): Number of units (total):30/2

7. Course supervisor name : Assist.Prof. Dr. Maitham Abdullah Ghaley

8. Module aims

Course objectives

- 1. Providing Clean Water:** Ensuring access to water suitable for drinking and human use, and ensuring the availability of sufficient quantities.
- 2. Waste Management:** Collecting and disposing of solid waste properly and safely, and monitoring its transportation methods and destinations to prevent the spread of disease.
- 3. Improving Infrastructure:** Rehabilitating and maintaining water and sewage networks to ensure the continuity and

	effectiveness of services. 4. Combating Disease Vectors: Controlling insects, rodents, and stray animals that may transmit diseases. 5. Reducing Pollution: Working to reduce environmental pollutants that cause respiratory and heart diseases and some types of cancer. 6. Promoting Health Awareness: Raising awareness about the importance of hygiene and environmental health through awareness campaigns, lectures, and educational publications. 7. Preserving the Environment: Improving the environmental conditions surrounding people and reducing pollution factors that harm the environment. 8. Promoting Human Dignity: Contributing to improving the lives of individuals by providing a healthy, safe, and dignified environment. 9. Improving work environments: Providing a cleaner workplace for workers by reducing pollution in industrial facilities.
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9. Learning and teaching strategies

Strategies	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Case studies and problem-based learning for practical applications. 4. Fieldwork and outdoor activities to directly observe ecosystems and collect environmental samples. 5. Laboratory work to conduct classification, quantitative and qualitative studies, and analyze data. 6. Group projects and collaborative learning to foster teamwork and diversity of perspectives.
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10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1. Providing Clean Water: Ensuring access to water suitable for drinking and human use, and ensuring the availability of sufficient quantities. 2. Waste Management: Collecting and disposing of solid waste properly and safely, and monitoring its transportation methods and	1. Definition of Environmental Sanitation and Objectives	1. Lectures and multimedia presentations to deliver foundational knowledge.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2		2. Environmental Sanitation Strategies	2. Interactive discussions and debates to encourage critical thinking.	
3	2		3. Scientific Description of Iraq's Environmental	3. Case studies	
4	2				
5	2				
6	2				
7	2				
8	2				
9	2				

10	2	destinations to prevent the spread of disease.	Conditions	and problem-based learning for practical applications.
11	2	3. Improving Infrastructure: Rehabilitating and maintaining water and sewage networks to ensure the continuity and effectiveness of services.	4. Environmental Degradation in Iraq	4. Fieldwork and outdoor activities to directly observe ecosystems and collect environmental samples.
12	2	4. Combating Disease Vectors: Controlling insects, rodents, and stray animals that may transmit diseases.	5. Strategic Objective 1: Protect and Improve Air Quality in Iraq	5. Laboratory work to conduct classification, quantitative and qualitative studies, and analyze data.
13	2	5. Reducing Pollution: Working to reduce environmental pollutants that cause respiratory and heart diseases and some types of cancer.	6. Strategic Objective 2: Protect and Improve Water Quality in Iraq	6. Group projects and collaborative learning to foster teamwork and diversity of perspectives.
14	2	6. Promoting Health Awareness: Raising awareness about the importance of hygiene and environmental health through awareness campaigns, lectures, and educational publications.	7. Strategic Objective 3: Protect and Improve Soil Quality in Iraq	
15	2	7. Preserving the Environment: Improving the environmental conditions surrounding people and reducing pollution factors that harm the environment.	8. Pollution of Iraqi Marine Waters and Aquatic Tourism	
		8. Promoting Human Dignity: Contributing to improving the lives of individuals by providing a healthy, safe, and dignified environment.	9. Preserving Biodiversity in the Iraqi Environment	
		9. Improving work environments: Providing a cleaner workplace for workers by reducing pollution in industrial facilities.	10. Developing and Improving Waste Management	
			11. Reducing Oil Pollution	
			12. Environmental Monitoring and Early Warning	

11. Course evaluation

Daily, monthly and final tests, follow-up reports and research projects

12. Learning and teaching resources

	Ahmed Madhat Islam, Pollution: The Problem of the Age (1990)
	Mohamed Ibrahim Hassan, Environment and Pollution (1995)
	(Abbas Al-Mariani, Environmental and Climatic Health (2025

Module Description E 452

1. Course Title: Occupational Health and Safety	
2. Course Code: E 452	
3. Semester/Year : 2025-2026	
4. Date this description was created: 1/9/2025	
5. Available Forms of Attendance : Physical	
6. Number of Hours of Study (Total) / Number of Units (Total): 2/30	
7. Name of the course administrator (if more than one name is mentioned) / Prof. Dr. Munther Abduljaleel Muhammad-Ali	
8. Course Objectives	
Course Objectives	1. Introducing the basic concepts of occupational health and safety and their importance in the work environment. 2. Identify the types of hazards (physical, chemical, biological,

	mechanical, psychological, and social) and methods of controlling them. 3. Acquire the necessary skills to implement prevention and safety measures in the workplace. 4. Develop awareness of local and international laws and legislation related to occupational health and safety. 5. Promoting a culture of safety and individual and collective responsibility among employees. 6. Learn first aid techniques and proper handling in emergencies and accidents. 7. Knowledge of occupational safety and health management systems such as ISO 45001 and OHSAS 18001. 8. Encouraging a safe and healthy work environment that contributes to increasing productivity and reducing occupational injuries and diseases. 9. Enhance risk assessment and analysis skills and propose practical solutions to reduce them. 10. Contributing to the protection of the environment from pollution resulting from industrial and service activities.
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9. Learning and teaching strategies

Strategy	1. Interactive lectures: To clarify the theoretical concepts and basic principles.
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	2. Hands-on and simulation: to acquire skills to deal with accidents and emergencies. 3. Problem-Based Learning and Case Study: To analyze real-life incidents and draw lessons. 4. Discussions and teamwork: to promote engagement and critical thinking. 5. Field Visits and Projects: To link the theoretical aspect with the practical application in the work environment.
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10. Course Structure

Evaluation Method	Learning method	Unit or Subject Name	Required Learning Outcomes	Hours	The week
Exams 70 degree Absorption 10 Share 10 Attendance10 Total Grade 100	Theoretical Learning: Through lectures and presentations. It focuses on the basic concepts, laws, and types of risks. Practical Learning: Field training on the use of protective equipment. Apply first aid and evacuation plans. Emergency Accident Simulation.	- Concepts in Safety - The importance of occupational health and safety - Public Safety Steps - Occupational health and safety goals - Elements of achieving the previous objectives - Occupational Health and Safety Standards - Fire hazards - Types of fire extinguishers - Other risks 1. Physical hazards	First: Knowledge and Understanding Outcomes 1. Define the basic concepts of occupational health and safety and their importance in the work environment. 2. Distinguishes between the types of occupational hazards (physical, chemical, biological, mechanical, psychological). 3. Clarifies local and international laws, legislations and standards related to safety.		
				2	1
				2	2
				2	3
				2	4
				2	5
				2	6
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				2	8
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				2	11
				2	12
				2	13
				2	14
				2	15

	Collaborative Learning : Group discussions and joint problem solving. Accomplish projects and reports in teams.	2- Mechanical hazards 3- Chemical hazards 4. Negative Risks 5. Biological hazards - Safety Tasks for Personal Protective - Occupational Safety and Health Labels	Second: Skills Outcomes (Practical/Mental) 1. Apply preventive measures and personal and collective protection methods in the work environment. 2. Analyzes occupational accidents using the risk assessment methodology. 3. Properly executes first aid, emergency and evacuation plans. Third: Outcomes of Trends and Values 1. Demonstrates a commitment to safe behavior and individual and collective responsibility in the work environment. 2. Actively participate in spreading the culture of occupational safety and health. Shall adhere to .3 professional practices that take into account human safety and the .environment		
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11. Course Evaluation

Tests, Project Discussion, Training Tests

12. Learning and Teaching Resources

Fundamentals of Occupational Health and Safety – Dr. Mohamed Abdel Ghani Hassan Hilal.	
Occupational Health and Safety: Foundations and Applications – Dr. Abdullah Ahmed Hussain.	
Occupational Health and Safety Department – Dr. Mahmoud Abdel Ghaffar Hassan.	
Occupational Safety and Health in the Workplace – Dr. Abdulrahman bin Sulaiman Al-Nimr.	