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

2024

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: رئيس القسم
الأستاذ الدكتور
مصطفى عبد الوهاب نجم

Date: 10/9/225

Signature:

Scientific Associate Name:

الأستاذ الدكتور
عادل علي عبد الحسين
معاون العميد للشؤون العلمية والدراسات العليا

Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: Rumya Ali Hussain

Signature: 10/9/2025

Approval of the Dean

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

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1. **Program Vision**
Program vision is written here as stated in the university's catalogue and website.

2. **Program Mission**
Program mission is written here as stated in the university's catalogue and website.

3. **Program Objectives**
General statements describing what the program or institution intends to achieve.

4. **Program Accreditation**
Does the program have program accreditation? And from which agency?

5. **Other external influences**
Is there a sponsor for the program?

6. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements				
College Requirements				

Department Requirements				
Summer Training				
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	Learning Outcomes Statement 1
Skills	
Learning Outcomes 2	Learning Outcomes Statement 2
Learning Outcomes 3	Learning Outcomes Statement 3
Ethics	
Learning Outcomes 4	Learning Outcomes Statement 4
Learning Outcomes 5	Learning Outcomes Statement 5

9. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

10. Evaluation methods

Implemented at all stages of the program in general.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)	Number of the teaching staff	
	General	Special		Staff	Lecturer

Professional Development

Mentoring new faculty members

Briefly describes the process used to mentor new, visiting, full–time, and part–time faculty at the institution and department level.

Professional development of faculty members

Briefly describe the academic and professional development plan and arrangements for faculty such as teaching and learning strategies, assessment of learning outcomes, professional development, etc.

12. Acceptance Criterion

(Setting regulations related to enrollment in the college or institute, whether central admission or others)

13. The most important sources of information about the program

State briefly the sources of information about the program.

14. Program Development Plan

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

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

Course Description Form

1. Course Name:

2. Course Code:

3. Semester / Year:

4. Description Preparation Date:

5. Available Attendance Forms:

6. Number of Credit Hours (Total) / Number of Units (Total)

7. Course administrator's name (mention all, if more than one name)
Name: Email:

8. Course Objectives

Course Objectives	• ..... • ..... • .....

9. Teaching and Learning Strategies

Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

MODULE DESCRIPTION E 203

1. Course name: Plant ecology	
2. Course code: E 203	
3. Semester/year: 2024	
4. Date of description preparation: 1/9/2024	
5. Available attendance forms: In-person	
6. Number of study hours (total): Number of units (total):30/3	
7. Course supervisor name : Lect. Dr. Suhad Abdulsada Taha	
8. Module aims	
Course objectives	Plant ecology aims to study the environment of plants and their interrelationship between them and the different environments and the effects of some of them on each other and on other organisms. Plant ecology also aims to know the forms of life in plants, whether they are Hydrophytes, Xerophytes, or Halophytes and

the adaptations of these plants to environmental conditions . Plant ecology also leads to knowledge of plant diversity, whether it is high diversity or low diversity, depending on the methods of measuring vegetation using the Quadrate method and Transect method.

9. Learning and teaching strategies

Strategies	1-Identify plant groups and their adapts to environmental conditions . 2-Distinguish between life forms in plants . 3-Calculating the Vegetation cover in a specific area .

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1-Plant Groups: Mosses, Ferns, Gymnosperms, Angiosperms.	1-Plant Groups: Mosses, Ferns, Gymnosperms, Angiosperms.	1-Display photos of plant communities and tables to differentiate between them. 2. Display tables and field photos to illustrate the differentiation between plant communities. 3. Display	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	2- Desert Plants, Halophytes, Aquatic Plants, Parasitic Plants.	2- Desert Plants, Halophytes, Aquatic Plants, Parasitic Plants.		
3	2	3-Ecological Succession: Primary			

		Succession, Secondary Succession, Freshwater Succession, Marine Succession, Environmental Disturbance.	3- Ecological Succession: Primary Succession, Secondary Succession, Freshwater Succession, Marine Succession, Environmental Disturbance.	videos to illustrate the differentiation between types of ecological succession.
4	**2**	4- Vegetation: Methods of studying vegetation, quadrat method, transect method, quantitative characteristics of plant communities.	4- Vegetation: Methods of studying vegetation, quadrat method, transect method, quantitative characteristics of plant communities.	4. calculate vegetation cover using the quadrate method and the transect method.
5	**2**	5- Plant Adaptations: Intermediate Plants, Aquatic Plants, Seasonal	5- Plant Adaptations: Intermediate Plants, Aquatic Plants, Seasonal	5. Presentation and illustrative photos.

		Plants, Annual Plants, Biennial Plants, Perennial Plants, Leafy Succulents, Stem Succulents.	Plants, Annual Plants, Biennial Plants, Perennial Plants, Leafy Succulents, Stem Succulents.	5. Laboratory work by collecting plant species and distinguishing between them.
6	2	6- Soil: Physical and Chemical Properties of Soil, Types of Water Content.	6- Soil: Physical and Chemical Properties of Soil, Types of Water Content.	6- Presentation to identify soil types, in addition to laboratory work through soil analysis.
7	2	7- Desertification : Cases of Desertification ,	7- Desertification : Cases of Desertification , \	7. Presentation.
8	2	8- Vegetation in Iraq: The Irano-Turanian region (Mesopotamia, Irano-Anatolian region), the	8- Vegetation in Iraq: Irano-Turanian region (Mesopotamia, Irano-Anatolian region), Saharo-	8. Presentation.

9	2	Arabian deserts), vegetation distribution in Iraq, plant communities. 9- Plant life forms.	Arabian deserts), Vegetation distribution in Iraq, Plant communities. 9- Plant life forms.	9. Presentation in addition to field work in the practical part. 10. Presentation.	
10	2	10- C3 plants, C4plants, and CAM plants.	10- C3 plants, C4 plants, and CAM plants.		

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	1-Flora of Iraq 2- Flora of Basra 3- Internet

MODULE DESCRIPTION E 343

1. Course name: Organic Pollution	
2. Course code: E 343	
3. Semester/year: 2024	
4. Date of description preparation: 1/9/2024	
5. Available attendance forms: In-person	
6. Number of study hours (total): Number of units (total):30/3	
7. Course supervisor name : Assist. Dr. Fadya Mushtaq Saleem	
8. Module aims	
Course objectives	1 - Acquire the skill of field work and collecting samples 2 - Increasing the skill of measuring physical and chemical variables that indicate organic pollution. 3 - Knowledge of diagnosing organic pollutants in the environment and how to treat them.

	4 - Ability to identify environmental safety from hazardous organic pollutants. 5 - Evaluating the state of the ecosystem and its effects on the rest of the elements of the ecosystem.

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- Identify the basics of organic compounds and their divisions. 2- Knowledge of organic pollutants in the environment and their types 3-Knowing the most important causes of air,	1. General Introduction 2. Organic compounds and their types 3. Classification of organic pollutants 4. Dioxins and furnaces 5. Organic dyes 6. Organic solvents 7. PAHs compounds 8.Air pollution with organic materials 9.Water pollution	1. Knowledge of fieldwork and sample collection. 2. Identify organic pollutants in different environments. 3. Ability to communicate information after monitoring and data collection. 4. Determine	**Exams: 60** **Comprehension: 10** **Participation: 10** **Attendance: 10** **Total: 100**
2	2				
3	2				
4	2				
5	2				
6	2				
7	2				
8	2				
9	2				
10	2				
11	2				

12 **13** **14** **15**	**2** **2** **2** **2**	water and soil pollution with organic pollutants and how to reduce them. 4-Knowledge of the devices and equipment used in collecting samples to study organic pollution. 5- Study of the most important organic pollutants that are dangerous to the environment and the health of living organisms, all the way to humans. 6- Know how to evaluate organic pollution by using environmental indices.	with organic materials 10.Water quality indices 11.Organic pollution indices 12.Issues and solutions 13.Soil contamination with organic materials 14.Water pollution with petroleum hydrocarbon compounds 15. The role of microorganisms in removing petroleum hydrocarbon compounds	the level of organic pollution in the environment. 5. Find appropriate solutions to reduce organic pollution in the environment.	

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	1-Environmental Pollution, Abdul Hadi Yahya Al-Sayegh and Arwa Shazal Taqah (2002). Al-Dar Al-Jamieah for Printing and Publishing. University of Mosul.

	2-Water operational guide, 3rd ed. National water research institute. Canada center for inland water, By GEMS (Global Environmental Monitoring System). (1997). Burlington, Ontario, 274 pp.
	3- United States Environmental Protection Agency. (2002). Persistent organic pollutants: A global issue, a global response.
	4- Impact and Issues of Organic Pollutants D. Geetha, E.R. Nagarajan, in Management of Contaminants of Emerging Concern (CEC) in Environment, 2021

MODULE DESCRIPTION E 351

1. Course name: Water Treatment Technologies

2. Course code: E 351

3. Semester/year: 2024

4. Date of description preparation: 1/9/2024

5. Available attendance forms: In-person

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

7. Course supervisor name : Assist. Dr. Fadya Mushtaq Saleem

8. Module aims	
Course objectives	1 – Knowing the most important methods to treat the wastewater. 2- Increasing the skill of measuring physical and chemical variables that required in water treatment. 3 - Acquirement the skills to diagnose potential contaminants in water and how to treat them.

			4- How to get clean, healthy and safe water for consumers.		

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- Identify the basics of water treatment technologies. 2- Acquire the skill of field work and collecting samples. 3- Knowledge of devices and equipment used in water treatment technology. 4- Study the	1. General Introduction in water quality 2. Basic concepts of water treatment processes 3. Wastewater characteristics and collection system 4. Pre-treatment stage 5. Primary treatment 6. Biological treatment 7. Principals of chlorination 8. Alternative disinfection methods 9. Sludge treatment 10. How to dispose of untreated wastewater 11. Membrane filters	1 - How to do field work and collect water samples 2 - Acquire the skill of measuring physical and chemical variables in water 3 - Acquire the skill of identifying potential pollutants in water and how to treat them 4 - Understand the role of microorganisms	**Exams: 60** **Comprehension: 10** **Participation: 10** **Attendance: 10** **Total: 100**
2	**2**				
3	**2**				
4	**2**				
5	**2**				
6	**2**				
7	**2**				
8	**2**				
9	**2**				
10	**2**				
11	**2**				
12	**2**				
13	**2**				
14	**2**				

| 15 | 2 | physical, chemical and biological factors of water to choose the appropriate treatment method.
5- Knowing the stages of wastewater treatment to obtain clean water. | 12. Industrial wastewater treatment
13. Examples of typical treatment plants
14. Phytoremediation
.15 Open discussion | and plants in purifying water of pollutants. | |

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	1- Environmental engineering,sixth edition edited by nelson l. nemerow, franklin j. agardy,patrick sullivan, and joseph a. salvato
	2- Environmental microbiology journal

Model 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.

9. Learning and teaching strategies

| Strategy | 1. Interactive lectures: To clarify the theoretical concepts and basic principles. |

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.

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** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2**	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13** **14** **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		

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.	

MODULE DESCRIPTION E 310

1. Course name: Natural Reserves

2. Course code: E 310

3. Semester/year: 2024

4. Date of description preparation: 1/9/2024

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.

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 3 4 5 6 7 8 9 10 11 12	2 2 2 2 2 2 2 2 2 2 2 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 Types of nature reserves The importance of nature reserves The role of nature reserves in protecting the environment The role of nature reserves in protecting the biodiversity **The role of nature reserves in preserving the ecological balance** The role of nature reserves in achieving sustainable development **Methods to cause changes in ecosystem** Mechanisms for establishing nature reserves Administrative control	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 adapt to key	Exams: 80 Comprehension: 10 Participation: 7 Attendance: 3 Total: 100

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

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

1- IUCN Red list Categories and -1 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 204

1. Course name: Classification of Animal

2. Course code: E 204

3. Semester/year: 2024

4. Date of description preparation: 1/9/2024

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** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13** **14** **15**	**2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **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:** 2. **Definition and scope of Taxonomy.** 3. **Historical stages of Taxonomy.** 4. **Importance of Taxonomy.** 5. **Fields of Taxonomy.** 6. **Classification systems.** 7. **Classification Concepts and Principles:** 8. **Scientific binomial nomenclature.** 9. **Rules for writing scientific name.** 10. **Main taxon.** 11. **Classification of living Organisms:** 12. **Kingdom Eubacteria.** 13. **Kingdom Archaebacteria.** 14. **Kingdom Protista.** 15. **Kingdom Fungi.** 16. **Kingdom Plantae.** 17. **Kingdom Animalia.**	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**

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

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 adition,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: 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.

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

			Wetland functions and values **Wetland classification**		

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. gosselinl (2015)
	Wetland indicators, a guide to wetland formation, identification, delineation, classification, and mapping. second edition.ralph w. tiner**(2017).**

MODULE DESCRIPTION E 402

1. Course name: Environmental laws and legislation
2. Course code: E 402
3. Semester/year: 2024
4. Date of description preparation: 1/9/2024
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.

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 3 4 5 6 7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	• Enable the student to understand environmental problems and their relationship with legal terminology. • Ensure the student recognizes the importance of the objectives of each organization and agreement studied. • Provide the student with the necessary	1. General Introduction 2. The Meaning of International Law, the Concept of Legislation, and the Role of Civil Society in Environmental Protection 3. Organizations Specialized in Environmental Protection: Their Roles, Activities, and Objectives 4. The Concept of Environmental Damage and Environmental Crime, and Their Forms 5. International	• 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 on specific	**Exams: 30 Comprehension: and Participation: 5 Attendance: 5 Total: 40 and final exam : 60**

| | | 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. | 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 Environmental | topics and practice effective delivery. | |

			Protection 14. Open Lecture for Discussion on What You Have Learned During the Course 15. Open Discussions and Seminars for Students		

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 207

1. Course name: Plankton and productivity
2. Course code: E 207
3. Semester/year: First semester 2024-2025
4. Date of description preparation: 1/9/2024
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.

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.

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	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	Introduction to plankton, their general characteristics, properties, ecological classifications, benefits, and harms. Phytoplankton, cyanobacteria, green algae, euglena, and protists. Bacilli, yellow, and golden algae. Collecting, preserving, and counting zooplankton.	1. Practical identification of the major groups of microscopic phytoplankton and microzooplankton. 2. Practical identification of the role of microplankton in the environment. 3. Ability to communicate information after monitoring and data collection. 4. Link information to environmental realities and its impact on other	**Exams: 60** **Comprehension: 10** **Participation: 10** **Attendance: 10** **Total: 100**

		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.	

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

	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 487

1. Course name: Environmental sanitation	
2. Course code: E 487	
3. Semester/year: First semester 2024-2025	
4. Date of description preparation: 1/9/2024	
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.

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.**

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1 **2** **3** **4** **5** **6** **7** **8** **9**	**2** **2** **2** **2** **2** **2** **2** **2** **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 2. Environmental Sanitation Strategies 3. Scientific Description of Iraq's Environmental	1. Lectures and multimedia presentations to deliver foundational knowledge. 2. Interactive discussions and debates to encourage critical thinking. 3. Case studies	**Exams: 60** **Comprehension: 10** **Participation: 10** **Attendance: 10** **Total: 100**

10 **11** **12** **13** **14** **15**	**2** **2** **2** **2** **2** **2**	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.	Conditions 4. Environmental Degradation in Iraq 5. Strategic Objective 1: Protect and Improve Air Quality in Iraq 6. Strategic Objective 2: Protect and Improve Water Quality in Iraq 7. Strategic Objective 3: Protect and Improve Soil Quality in Iraq 8. Pollution of Iraqi Marine Waters and Aquatic Tourism 9. Preserving Biodiversity in the Iraqi Environment 10. Developing and Improving Waste Management 11. Reducing Oil Pollution 12. Environmental Monitoring and Early Warning	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.	

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 209

1. Course name: Ecophysiology
2. Course code: E 410
3. Semester/year: 2024-2025
4. Date of description preparation: 1/9/2024
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.

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

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**	Thermoliphic 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).**		
7	2	Osmosis pressure			
8	2	Adaptation of marine and fresh water organism to the habitats.			
9	2	Respiratory Adaptations of Aquatic Organisms	**5.Understanding the importance of light and its effects on both aquatic organisms and terrestrial animals.**		
10	2	Bohr effect			
11	2	Oxygen and CO2 EXCHANG		**3.Linking information to the environmental context and its impact on other organism**	
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			

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

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

MODULE DESCRIPTION E 476

1. Course name: Industrial pollutants

2. Course code: E 476

3. Semester/year: 2025-2026

4. Date of description preparation: 12/9/2025

5. Available attendance forms: In-person

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

7. Course supervisor name: Prof. Assistant Inaam Abdulamer Abdulhusein

8. Module aims	
Course objectives	1. Understanding the basic industries and what they produce in the environment. 2. Recognizing how these pollutants affect the ecosystem. 3. Identifying the role of regulatory bodies

	and individuals in reducing pollution. **4. Understanding the impact of various environmental factors on the concentration of these pollutants in the environment.** **5. Knowing the proper methods for establishing industrial facilities that are not harmful to the environment and the conditions that must be met in industrial environments.** **6. Learning the most important methods for treating these pollutants.** **7. Gaining field knowledge of prominent local industrial facilities.** **8. Gaining practical experience in measuring these pollutants in the environment.**

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**

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method

		1-Introduction to industrial pollution. 2- Identifying the patterns of relationship between cities and industry. 3- Identifying forms of industrial pollution. 4Understanding the impact of various environmental factors on industrial pollution and their interaction with it. 5- The infrastructure of a proper approach to dealing with industrial pollution.	General IntroductionThe Basic Classification of PollutantsIndustrial Pollutants in Air Industrial Pollutants in Soil Industrial Pollutants in Water Physical Industrial Pollution Classification of Factories According to the Waste They Generate Industrial Hazard Classifications Distinctive Pollutants and Hazardous Pollutants International Standards and Their Application to Industrial Waste Management	1. The practical identification of the presence of masks in the environment. 2. The ability to convey information after monitoring and data collection. 3. Linking information to the environmental reality and its impact on other living beings.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	Advanced Air and Noise Pollution Control. Lawrence K. Wang et al. 2005
	Hazardous waste treatment and disposal. Mohamed Ahmed Elsayed 2011
	Environmental and Sanitary Engineering Mohamed Ahmed Khalil 2010
	Environmental toxicity and biological interactions with chemicals and pesticides. Zidane Hindi Abdul Hamid 2000

MODULE DESCRIPTION E 206

1. Course name: Climate Changes

2. Course code: E 206

3. Semester/year: 2024-2025

4. Date of description preparation: 1/9/2024

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

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 333

1. Course name: Meteorology	
2. Course code: E 333	
3. Semester/year: 2024-2025	
4. Date of description preparation: 1/9/2024	
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 3 4 5 6 7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1. Define basic meteorological concepts (weather & climate). 2. Analyze atmospheric processes (condensation, evaporation, cloud formation). 3. Distinguish cloud types and related phenomena. 4. Interpret climate data and weather maps for prediction. 5. Use instruments to measure weather elements. 6. Evaluate impacts of weather and climate on human activities	1. Introduction to Meteorology: concept, atmosphere components, and layers. 2. Weather Elements: temperature, pressure, wind, humidity, and precipitation. 3. Atmospheric Processes: heat transfer, pressure systems, wind formation, humidity, and condensation. 4. Clouds and Precipitation: types, classification, and formation mechanisms. 5. Observation and Forecasting: instruments, weather maps, satellite and radar images.	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

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 E110

1. Course name: Molecular cytology

2. Course code: E 110

3. Semester/year: 2024

4. Date of description preparation: 1/9/2024

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

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

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 209

1. Course name: Marine Ecology
2. Course code: E 302
3. Semester/year: 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 3 4 5 6 7 8 9	2 2 2 2 2 2 2 2 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. Extensions and depths of the oceans. Neritic and oceanic zone. Ocean currents and the Coriolis effect. El Nino and La Nina.	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**

10 11 12 13 14 15	2 2 2 2 2 2	the extremes that occur in these currents. 3. Understanding the nature of the deep seas and how life can be found there. 4. Learn how organisms resist the pressure of the water column to live in the depths. 5. Understanding the distribution of productivity between the seas, the reasons for the difference in productivity, and the most productive regions in the world.	Monsoon's current. Eddies and meddies. Subsurface and bottom currents. The physical properties of water. Chemical properties of seas. Marine biology. Oceanic productivity. Factors affecting productivity.	Estimation of Carbon Dioxide. Nutrients in marine water. Fieldwork on a ship. Life in oceans. Adaptation to planktonic life in oceans. 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 209

1. Course name: plant taxonomy	
2. Course code: E 202	
3. Semester/year: 2024	
4. Date of description preparation: 1/9/2024	
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

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.

10. Course structure

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

			and leaves. 4- Types of flowers and flower parts. 5- Types of inflorescences. 6- Types of fruits. 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 **12** **13** **14** **15**	**2** **2** **2** **2** **2**	of plants and their parts, students can easily trace them to their plant families. 4. Know how to use taxonomic keys for Iraqi plants. factors on the presence of microorganisms in the environment 5.Knowing the environmental role played by microorganisms in different environments		and data collection. 4. Linking information to environmental conditions and their impact on plants.

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 436

1.	**Course name: Hydrology**	
2.	**Course code: E 436**	
3.	**Semester/year: 2024**	
4.	**Date of description preparation: 1/9/2024**	
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.

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

			pollution). Water balance concept.		

11.	Course evaluation

Tests, project discussion, practical tests

12.	Learning and teaching resources

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

MODULE DESCRIPTION E430

1. Course name: Molecular cytology
2. Course code: E 430
3. Semester/year: 2024
4. Date of description preparation: 1/9/2024
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 3 4 5 6 7 8 9 10 11	2 2 2 2 2 2 2 2 2 2 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 The nucleic acids structure DNA replication Transcription and Translation The bacterial conjugation The bacterial transformation Exam Transduction	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100

12 **13** **14** **15**	**2** **2** **2** **2**	8. Transduction 9. Mutation 10. Genetic fingerprinting 11. The genetic drift 12. The genetic Flow 13. Hardy-Weinberg law of genetic equilibrium Exam	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.	Mutation Genetic fingerprinting The genetic drift The genetic Flow Hardy-Weinberg law of genetic equilibrium Exam OPEN DISCUSSION

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 209

1. Course name: Environmental disasters	
2. Course code: Eco 340	
3. Semester/year: 2024	
4. Date of description preparation: 1/9/2024	
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** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13** **14** **15**	**2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2** **2**	1- Identifying the most prominent risks facing the environment 2- Identifying the most prominent local environmental disasters. 3- confrontation human activity on the types of disasters and prevent the frequency of their occurrence. 4- Identify the types of industrial pollutants in the environment, their sources, and how to	1-General Introduction Types of disasters. 2-Classification of environmental hazards and disasters. 3-Types of natural disasters. 4-Earthquakes. 5-Volcanoes. 6- Forest Fire. 7- Tsunami waves. 8-Torrents. 9-Flood. 10-Desertification. 11-Drought. 12-Sandstorms. 13-Tornadoes	**Theoretical**	**Exams: 60** **Comprehension: 10** **Participation: 10** **Report: 10** **Attendance: 10** **Total: 100**

		treat them before and after they are released to the environment	14- Geomorphological disasters. 15- Crisis management		

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 421

1. Course name: Environmental Toxicology

2. Course code: E 421

3. Semester/year: 2024

4. Date of description preparation: 1/9/2024

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 nd 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, wate
	r, soil, images and forms in which these materials are present in theseenvironments 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 3 4 5 6 7	2 2 2 2 2 2 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

8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2	the natural and xenobiotic chemicals causes' disease on health. 3. Understanding how carcinogenesis chemical cause cancer. 4. Knowledge the main group of toxic chemical. 5. Knowledge how toxic chemical react with biological cells. 6. Knowledge the different factors of effect on health with toxins.	–Response Mode of Entry of Toxins Exam Digestive System Route Carcinogenesis and Cancer Exposure through the skin Blood Kidneys Algal Toxins Animal toxins Plant Toxins OPEN DISCUSSION	of environmental pollution and the most important characteristics that must be present in a biological indicator LC50 test and factors affecting the test procedure How to calculate LC50 using a 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 Pollutants2004	

Basics of Environmental Toxicology	

MODULE DESCRIPTION E 456

1. Course name: Phytoremediation	
2. Course code: E 456	
3. Semester/year: 2024	
4. Date of description preparation: 1/9/2024	
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 3 4 5 6 7 8 9 10 11 12 13 14 15	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Understand the interrelationship and influences between plants and various factors. 2. Understand how plants and bacteria interact to treat pollution. 3. Understand how human activities cause pollution and how plants reduce it. 4. Understand the role of plants in purifying the air of pollutants. 5. Understand how phytoremediation alters water pollution. 6. Understand the factors that determine	General Introduction Remediation Methods Environmental Technologies and Phytoremediation Examples of Environmental Technology Applications Benefits of Phytoremediation Exam One Basics of Environmental Remediation Characteristics of Plants Selected for Remediation Aquatic Plants in Remediation Artificial Wetlands Free-Running Wetlands Horizontal Wetlands Vertical Wetlands	Introduction to Phytoremediation Selecting the best plants Preparing solutions for heavy metals and petroleum hydrocarbons Propagating plants, preparing soil, and studying their properties Toxicity tests to determine optimal concentrations	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100

		pollution levels.	Mixed Wetlands 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 314

1. Course name: Natural Resources and Energy Sources	
2. Course code: E 314	
3. Semester/year: 2024	
4. Date of description preparation: 1/9/2024	
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.

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.

10. Course structure

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

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

		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 401

1. Course name: Waste treatment and recycling

2. Course code: E 401

3. Semester/year: 2024

4. Date of description preparation: 1/9/2024

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 3 4 5 6 7 8 9 10	2 2 2 2 2 2 2 2 2 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 Main Types of Solid Waste in the Environment Hazardous Waste in the Environment Learning About Waste Management Waste Treatment and Recycling	1- Present lecture content clearly and organized, explaining key points. 2- Use visual aids such as images, graphics, and concept maps to illustrate complex concepts. 3- Pose stimulating discussion questions that contribute to arousing curiosity	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100

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

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

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 203

1. Course name: Plant ecology
2. Course code: E 203
3. Semester/year: 2024
4. Date of description preparation: 1/9/2024
5. Available attendance forms: In-person
6. Number of study hours (total): Number of units (total):30/3
7. Course supervisor name : Lect. Dr. Suhad Abdulsada Taha
8. Module aims

Course objectives	Plant ecology aims to study the environment of plants and their interrelationship between them and the different environments and the effects of some of them on each other and on other organisms. Plant ecology also aims to know the forms of life in plants, whether they are Hydrophytes, Xerophytes, or Halophytes and

the adaptations of these plants to environmental conditions . Plant ecology also leads to knowledge of plant diversity, whether it is high diversity or low diversity, depending on the methods of measuring vegetation using the Quadrate method and Transect method.

9. Learning and teaching strategies

Strategies	1-Identify plant groups and their adapts to environmental conditions . 2-Distinguish between life forms in plants . 3-Calculating the Vegetation cover in a specific area .

10. Course structure

Week	Hours	Module Learning Outcomes	Topics	Learning method	Evaluation method
1	2	1-Plant Groups: Mosses, Ferns, Gymnosperms, Angiosperms.	1-Plant Groups: Mosses, Ferns, Gymnosperms, Angiosperms.	1-Display photos of plant communities and tables to differentiate between them.	Exams: 60 Comprehension: 10 Participation: 10 Attendance: 10 Total: 100
2	2	2- Desert Plants, Halophytes, Aquatic Plants, Parasitic Plants.	2- Desert Plants, Halophytes, Aquatic Plants, Parasitic Plants.	2. Display tables and field photos to illustrate the differentiation between plant communities.	
3	2	3-Ecological Succession: Primary		3. Display	

		Succession, Secondary Succession, Freshwater Succession, Marine Succession, Environmental Disturbance.	3- Ecological Succession: Primary Succession, Secondary Succession, Freshwater Succession, Marine Succession, Environmental Disturbance.	videos to illustrate the differentiation between types of ecological succession.
4	**2**	4- Vegetation: Methods of studying vegetation, quadrat method, transect method, quantitative characteristics of plant communities.	4- Vegetation: Methods of studying vegetation, quadrat method, transect method, quantitative characteristics of plant communities.	4. calculate vegetation cover using the quadrate method and the transect method.
5	**2**	5- Plant Adaptations: Intermediate Plants, Aquatic Plants, Seasonal	5- Plant Adaptations: Intermediate Plants, Aquatic Plants, Seasonal	5. Presentation and illustrative photos.

		Plants, Annual Plants, Biennial Plants, Perennial Plants, Leafy Succulents, Stem Succulents.	Plants, Annual Plants, Biennial Plants, Perennial Plants, Leafy Succulents, Stem Succulents.	5. Laboratory work by collecting plant species and distinguishing between them.	
6	**2**	6- Soil: Physical and Chemical Properties of Soil, Types of Water Content.	6- Soil: Physical and Chemical Properties of Soil, Types of Water Content.	6- Presentation to identify soil types, in addition to laboratory work through soil analysis.	
7	**2**	7- Desertification : Cases of Desertification ,	7- Desertification : Cases of Desertification , \	7. Presentation.	
8	**2**	8- Vegetation in Iraq: The Irano-Turanian region (Mesopotamia, Irano-Anatolian region), the	8- Vegetation in Iraq: Irano-Turanian region (Mesopotamia, Irano-Anatolian region), Saharo-	8. Presentation.	

| 9 | 2 | Arabian deserts), vegetation distribution in Iraq, plant communities.

9- Plant life forms. | Arabian deserts), Vegetation distribution in Iraq, Plant communities.

9- Plant life forms. | 9. Presentation in addition to field work in the practical part.

10. Presentation. | |
| 10 | 2 | 10- C3 plants, C4plants, and CAM plants. | 10- C3 plants, C4 plants, and CAM plants. | | |

11. Course evaluation

Tests, project discussion, practical tests

12. Learning and teaching resources

	1-Flora of Iraq 2- Flora of Basra 3- Internet