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

Department of Fisheries & Marine Resources

2025

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: **University of Basrah**
Faculty/Institute: **College of Agriculture**
Scientific Department: **Department of Fisheries & Marine Resources**
Academic or Professional Program Name: **Fisheries & Marine Resources**
Final Certificate Name: **Bachelor's**
Academic System: **Semester system**
Description Preparation Date: **11 June 2025**
File Completion Date: **18 June 2025**

Signature:
Head of Department Name:
Prof. Dr. Khalidah Salim Al-Niaeem
Date: **18 June 2025**

Signature:
Scientific Associate Name:
Prof. Dr. Sadiq Jabar Muhsin
Date: **19 June 2025**

The file is checked by: **Prof. Dr. Riyadh A. Al-Tameemi**
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Date: **25 June 2025**
Signature:

Prof. Dr. Sarmad Ghazi Mohammed Al-Shawi
Approval of the Dean

1. Program Vision

The Department of Fisheries and Marine Resources aspires to play a leading role in promoting education, scientific research, and community service in the fields of fisheries, aquaculture, and marine resources. The department plays a significant role in serving as a model of excellence in providing high-quality education, supported locally and internationally, and keeping pace with the times by providing an academic environment where students and faculty interact to create a conducive learning environment.

2. Program Mission

The mission of the Department of Fisheries and Marine Resources is to provide distinguished and contemporary education to prepare graduates as professionals capable of identifying, evaluating, and solving complex and multi-layered problems in the field of environmental science and engineering. It is to encourage applied and academic research with a focus on the design and implementation of sound, feasible, and sustainable engineering solutions to the environmental issues facing the world. It is also to prepare skilled, innovative, and multidisciplinary professionals at the national level, who will be effective specialists to coordinate and collaborate with public institutions, the industrial sector, and other local and international bodies to implement proposed sustainable solutions.

3. Program Objectives

The goals of the Department of Fisheries and Marine Resources are:

To create, disseminate, and integrate knowledge in engineering, science, and technology that expands our knowledge base related to fisheries and marine resources, which in turn enables the improvement of human society.

To develop and transfer innovative applications of engineering, science, and technology to improve fisheries and marine resources practices.

To be recognized by peers as a highly effective leader in conducting interdisciplinary research and developing innovative approaches to solving fisheries and marine resources problems.

To attract and welcome undergraduate students to the Bachelor of Science in Fisheries and Marine Resources program, and to award the bachelor's degree to students who possess innovative problem-solving skills, who are expected to become leaders in their organizations, and who possess the knowledge and skills required for a wide range of careers.

To maintain an intellectually challenging, yet supportive and welcoming environment that encourages and enables our students, faculty, and staff to achieve their best in a diverse community.

To emphasize scientific research and its leading role in helping serve society and solve its problems through applied research. Continuously developing curricula and study plans for all academic levels within the department to keep pace with the latest developments in the field of fisheries and marine resources. Collaborating with relevant public sector institutions to provide scientific and engineering consultations and prepare various training courses to develop and build the capacity of their engineering staff.

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

5. Other External Influences
Is there a sponsor for the program? Opportunities for support

6. Program Structure				
Program Structure	**Number of Courses**	**Credit Hours**	**Percentage**	**Reviews***
Institution Requirements	**1**	**2**	**%1.49**	**basic**
College Requirements	**12**	**22.5**	**%16.79**	**basic**
Department Requirements	**34**	**109.5**	**%81.72**	**basic**
Summer Training	**1**			
Others			**100%**	

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

7. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
			Theoretical	**Practical**
2024 - 2025 Second Stage	COMP202	Computer Applications /3	**-**	**3**
2024 - 2025 Second Stage	BACR205	AL Baath Crimes	**2**	**-**
2024 - 2025 Second Stage	BITE242	Biotechnology	**2**	**3**
2024 - 2025 Second Stage	ICTH245	Ichthyology	**2**	**3**
2024 - 2025 Second Stage	AQEC212	Aquatic Ecology	**2**	**3**
2024 - 2025 Second Stage	AQIN213	Aquatic Insects	**2**	**3**

2024 - 2025 Second Stage	SEDM214	Sedimentology	2	3
2024 - 2025 Second Stage	COFI215	Commercial Fisheries	2	-
2024 - 2025 Second Stage	FIPR216	Field Practice/ 1	-	3
2024 - 2025 Second Stage	ORCH225	Organic Chemistry	2	3
2024 - 2025 Second Stage	ENGL206	English Language / 2	1	-
2024 - 2025 Second Stage	FINU218	Fish Nutrition	2	3
2024 - 2025 Second Stage	TXCH219	Taxonomy of Chondrichthyes	2	3
2024 - 2025 Second Stage	BIOS220	Biostatistics	2	3
2024 - 2025 Second Stage	ORFI221	Ornamental Fish	2	3
2024 - 2025 Second Stage	FIPR217	Field practice/ 2	-	3
2024 - 2025 Second Stage	COMP203	Computer Applications /4	-	3
2024 - 2025 Third Stage	DAEX327	Design and Analysis of	2	3
2024 - 2025 Third Stage	FSBI312	Fish Biology	2	3
2024 - 2025 Third Stage	OSTX314	Osteichthyes Taxonomy	2	3
2024 - 2025 Third Stage	AQPH315	Aquatic Animal Physiology	2	3
2024 - 2025 Third Stage	FDTC316	Fish Diet Technology	2	3
2024 - 2025 Third Stage	MWEN317	Marshes and Wetlands	2	3
2024 - 2025 Third Stage	ENGL306	English Language /3	1	--
2024 - 2025 Third Stage	BICH330	Biochemistry	2	3
2024 - 2025 Third Stage	AGEX313	Agricultural Extension	2	-
2024 - 2025 Third Stage	FSTO318	Fish Stock	2	3
2024 - 2025 Third Stage	INVR319	Invertebrates	2	3
2024 - 2025 Third Stage	FSGN320	Fish Genetics	2	3
2024 - 2025 Third Stage	RVLK321	Rivers and Lakes	2	3
2024 - 2025 Third Stage	AQEN322	Aquaculture Engineering	2	3
2024 - 2025 Fourth Stage	SEMN423	Seminars	1	-
2024 - 2025 Fourth Stage	GRPR421	Graduation Project/ 1	-	3
2024 - 2025 Fourth Stage	FSDS412	Fish Parasites and Diseases	2	3
2024 - 2025 Fourth Stage	AQUA413	Aquaculture	2	3
2024 - 2025 Fourth Stage	MREC414	Marine and Estuaries Ecology	2	3

2024 - 2025 Fourth Stage	PHYT415	Phytoplankton	2	3
2024 - 2025 Fourth Stage	AQPL416	Aquatic Plants	1	3
2024 - 2025 Fourth Stage	FSMK417	Fisheries Economy and Marketing	2	-
2024 - 2025 Fourth Stage	ENGL406	English Language /4	1	--
2024 - 2025 Fourth Stage	GRPR422	Graduation Project /2	-	3
2024 - 2025 Fourth Stage	MRBI418	Marine Biology	2	3
2024 - 2025 Fourth Stage	ARBR419	Artificial Breeding	2	3
2024 - 2025 Fourth Stage	FSTC420	Fish Technology	2	3
2024 - 2025 Fourth Stage	FSMN424	Fisheries Management	2	-
2024 - 2025 Fourth Stage	MCTC425	Microscopic Technique	2	3
2024 - 2025 Fourth Stage	ECPL426	Ecological Pollution	2	3

8. Expected Learning Outcomes of Program	
Knowledge	
A1- The basics of culture and propagating aquatic organisms and manufacturing feeds.	Learn the basic principles of culture and propagating fish and aquatic organisms and manufacturing feed using modern methods.
A2- The basics of fisheries and fresh and marine water aquatic resources.	Learn the basic principles of fishing, aquatic life, and exploiting the biological resources found in fresh and marine water bodies using modern methods.
A3- The basics of the aquatic environment, its preservation, and the problems of water pollution.	Learn the basic principles of preserving the aquatic environment, environmental diversity, sustainability, and avoiding environmental pollutants and their negative effects.
A4- Knowledge of modern applications in the above fields.	Identify modern and advanced applications in the fields of knowledge related to fish farming and fisheries.
Skills	

B1- Skills of culture, propagating and feeding aquatic organisms.	The ability to establish and manage fish and aquatic life farms, determine the nutritional needs of aquatic organisms, and manufacture their feed using modern methods and using low-cost feed sources that meet their actual needs.
B2- Skills in catching aquatic organisms, enhancing stocks, and benefiting from fisheries in a sustainable manner.	The ability to use correct and effective methods in catching aquatic organisms and identify fishery sites that can be used, with the ability to estimate the stock and the possible percentage of use from it, and determine the appropriate fishing times and the times at which fishing activities must be stopped to preserve the stock or places that need activities to enhance the stock.
B3- Skills for dealing with the aquatic environment in the correct ways and preserving it.	The ability to assess the state of the aquatic environment, detect imbalances and pollution that occur in it, and develop plans and procedures to correct them or reduce their negative effects on the aquatic organisms present in them.
B4- Skills in using modern and advanced applications and methods in the field of culture, fisheries and the environment.	The ability to use the latest methods with regard to culture and catching aquatic organisms and their environment, such as culturing fish and aquatic organisms in closed and intensive systems, using genetic techniques and feed manufacturing techniques to increase productivity, as well as using advanced fishing methods and exploiting fisheries in modern ways to prevent their depletion and maintain their sustainability, and learning to use modern and advanced techniques in monitoring the aquatic environment and discovering imbalances and pollution that occur in it early to prevent them or reduce their negative effects.
Ethics	
C1- Providing study programs that suit the needs of society, the labor market, and lifelong education.	The department's academic program seeks to be distinguished by providing study programs appropriate to the needs of society from academic cadres who possess the moral and cognitive values to develop the country and lead the wheel of agricultural production and food security.
C2- Devoting the creativity and innovation capabilities of students.	The department's academic program seeks to devote the creativity and innovation capabilities of students to meet the challenges they will face after their graduation and during them working lives, whether in the public or private sector, by developing their abilities and motivating them to analyze problems and program appropriate solutions to them.

C3- Working as a team.	The department's academic program seeks to instill a culture of team work among the department's students and cooperate in overcoming the difficulties, they face in their academic life or after their graduation, as well as strengthening their ties with the program's teaching staff and giving them the opportunity to benefit from their professors in all aspects, whether cognitive, social, or personal.
C4- Possessing the correct moral values in professional and social dealings.	The department's academic program seeks to instill the correct moral values in students from a professional standpoint in their dealings with the labor market and its requirements or in their dealings with the society in which they will practice their professional activities.

9. Teaching and Learning Strategies

This is done through theoretical and practical lectures related to the curriculum, as well as the scientific application of lessons that require it. It is achieved through methods of discussion and debate, directing questions to students, using modern presentation tools, organizing festivals, and employing modern methods and techniques in teaching methods.
1. Lecture
2. Discussion and dialogue
3. Enrichment questions
4. Direct questioning

10. Evaluation Methods

• Periodic, monthly, and daily exams.
• Field practice.
• Discussion of graduation projects.
• Extracurricular activities.
• Various homework assignments and writing scientific reports on practical laboratory experiments.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (If Applicable)		Number of Teaching Staff	
	General	Special			Staff	Lecturer
Professor	Biology	Fish health			√	

Professor	Biology	Fish dynamics			√	
Professor	Fisheries	Fish reproduction			√	
Professor	Fisheries	Fish biology & ecology			√	
Professor	Fisheries	Parasites & diseases			√	
Professor	Fisheries	Fish management			√	
Professor	Fisheries	Fish culture & Feeding			√	
Professor	Fisheries	Fish physiology			√	
Professor	Fisheries	Aquatic ecology			√	
Assistant Professor	Fisheries	Parasites & diseases			√	
Assistant Professor	Fisheries	Pollution & Ecology			√	
Assistant Professor	Fisheries	Fish physiology			√	
Assistant Professor	Fisheries	Fish biology			√	
Lecturer	Fisheries	Aquatic ecology			√	
Lecturer	Fisheries	Fish Physiology			√	
Professor	Fisheries	Fish culture & Feeding			√	
Professor	Fisheries	Fish technology			√	
Assistant Professor	Fisheries	Fish biology			√	
Assistant Professor	Biology	Aquatic ecology			√	
Assistant Professor	Fisheries	Fish culture			√	
Lecturer	Fisheries	Fish culture			√	
Lecturer	Food science	Food technology			√	
Professor	Physics	Crops technology			√	
Assistant Professor	History	Modern Asia History				√
Lecturer	Plant protection	Plant Fungi			√	
Assistant Professor	Plant protection	Pesticides			√	
Assistant Professor	Plant protection	Chemistry & technology			√	
Lecturer	Plant protection	Insects			√	
Assistant Professor	Soil Science	Soil classification			√	
Assistant Professor	Food Science	Biotechnology			√	
Lecturer	Arabic Language	Arabic Language				√

Professional Development

Monitoring New Faculty Members

✓ Guiding new faculty members into academic work.
✓ Working on diversifying classroom management methods and involving them in practical lectures and presentations.
✓ Conducting personal interviews to assess the teaching competence and skills of the faculty member.
✓ Involving them in publishing research in internationally recognized journals with impact factors, writing books, and participating in workshops and conferences.

Professional Development for Faculty Members

1- Communicating newly acquired knowledge, information, and research findings to the faculty and linking them to daily work experiences.
2- Providing educational opportunities for faculty members to access and gain new information, knowledge, and modern experiences for professional growth.
3- Establishing integration between continuing education programs and production, health, and professional institutions.
4- Achieving integration between formal education and continuing education through the development of methods and formats that ensure this integration.

12. Acceptance Criterion

1- Admission requirements for the college:
The admission process follows the guidelines and procedures set by the Ministry of Higher Education and Scientific Research - Central Admission Department. Graduates of the preparatory stage (scientific branch) are nominated for admission to the college based on their graduation averages.
2- Admission requirements for the scientific department:
Students are allowed to select their preferred department from among multiple options based on priority.
The student's GPA in the desired department is taken into consideration.
The capacity and enrollment limit of the scientific department are considered during the admission process.

13. The Most Important Sources of Information About The Program

1- Websites of Iraqi and foreign universities.
2- Academic program guide.
3- Scientific libraries.
4- Workshops conducted by the Ministry of Higher Education.

14. Program Development Plan

✓ Regular evaluation and review of the program, based on recommendations or proposals resulting from the annual reports of the programs and course reports.
✓ Developments that have occurred in the field of the program in terms of scientific and technological aspects, as well as research recommendations and studies.
✓ Market variables, available job opportunities, and their requirements.
✓ Recommendations from the university or external institutions for the development of existing programs.
✓ Results of surveys conducted among the beneficiaries of the graduates.
✓ Passage of five years or more since the implementation of the curriculum and completion of the feedback loop.

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**
2024 - 2025 Second Stage	COMP202	Computer Applications	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	BACR205	AL Baath Crimes	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	BITE242	Biotechnology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	ICTH245	Ichthyology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	AQEC212	Aquatic Ecology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	AQIN213	Aquatic Insects	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	SEDM214	Sedimentology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	COFI215	Commercial Fisheries	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	FIPR216	Field Practice/ 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	ORCH225	Organic Chemistry	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	ENGL206	English Language / 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

2024 - 2025 Second Stage	FINU218	Fish Nutrition	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	TXCH219	Taxonomy of Chondrichthyes	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	BIOS220	Biostatistics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	ORFI221	Ornamental Fish	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	FIPR217	Field practice/ 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Second Stage	COMP203	Computer Applications	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	DAEX327	Design and Analysis of	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	FSBI312	Fish Biology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	OSTX314	Osteichthyes Taxonomy	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	AQPH315	Aquatic Animal	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	FDTC316	Fish Diet Technology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	MWEN317	Marshes and Wetlands	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	ENGL306	English Language /3	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	BICH330	Biochemistry	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	AGEX313	Agricultural Extension	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	FSTO318	Fish Stock	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	INVR319	Invertebrates	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

2024 - 2025 Third Stage	FSGN320	Fish Genetics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	RVLK321	Rivers and Lakes	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Third Stage	AQEN322	Aquaculture Engineering	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	SEMN423	Seminars	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	GRPR421	Graduation Project/ 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	FSDS412	Fish Parasites and Diseases	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	AQUA413	Aquaculture	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	MREC414	Marine and Estuaries	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	PHYT415	Phytoplankton	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	AQPL416	Aquatic Plants	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	FSMK417	Fisheries Economy and	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	ENGL406	English Language /4	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	GRPR422	Graduation Project /2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	MRBI418	Marine Biology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	ARBR419	Artificial Breeding	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	FSTC420	Fish Technology	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	FSMN424	Fisheries Management	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

2024 - 2025 Fourth Stage	MCTC425	Microscopic Technique	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
2024 - 2025 Fourth Stage	ECPL426	Ecological Pollution	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

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

Field Practice Course Description /2

1. Course Name
Field practice/2
Course Code .2
BICH330
3. Semester/Year
Second Semester/ 2024-2025
Date of preparation of this description .4
15/ 9/ 2024
5. Available attendance forms
Full
6. Number of credit hours (total) / number of units (total)
3 hours
7. Course administrator's name (if more than one name is mentioned)
Email: Prof. Fatima Abdel Hussein Mohamed Name: fatima.sultan@uobasrah.edu.iq
8. Course Objectives

2. Linking theoretical knowledge to practical application in real-world work environments. 3. Develop field skills in the specialization through direct practical training. 4. Gain experience in operating tools and equipment specific to the field of study. 5. Enhance the student's ability to analyze problems and propose applied solutions. 6. Identify the nature of institutional work in production and research institutions. 7. Developing teamwork and professional communication skills. 8. Training the student on preparing technical reports and scientific documentation of activities. 9. Promote professional behavior and commitment to fieldwork ethics. 10. Motivating the student to think entrepreneurial in specialized projects. 11. Preparing the student for the labor market	1. Course Objectives

9. Teaching and learning strategies

• Involve students in field training within institutions related to the specialization. • Directing students towards the implementation of practical activities planned under direct academic supervision. • Encourage students to prepare analytical field reports documenting their experiences. • Evaluating students' performance in the field according to specific professional and scientific standards.	Strategy

10. Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning	Hours	Week
+ Presence Participation	Introductory Lecture + Discussion	Preparation and general guidance for field practice	Identify the objectives of the training and areas of practical application	3	1
Short descriptive report	Field visit	Learn about the institution and its field of work	Understand the organizational structure of host institutions	3	2

+ Field Note Supervisor Assessment	Face-to-face training	Introduction to measurement tools or field work	Acquire initial skills in handling used equipment or systems	3	3
Questionnaire/quiz	Demo + practical application	Safety in the work environment	Application of occupational safety measures on site	3	4
Weekly Field Report	Accompany supervisors + take notes	Follow up on the daily activities of the institution	Monitoring and analyzing day-to-day operations in the professional	3	5
Short presentation	Staff Interview + Direct Note	Internal organization of fieldwork	Distinguish between technical and administrative tasks in the field of	3	6
Practical assessment	Direct field participation	First practical application	Participate in the implementation of a simple field activity under the	3	7
Log delivery	Prepare a field record	Documenting the steps of fieldwork	Developing the skill of scientific documentation of work activities	3	8
Evaluation of the status report	Teamwork + Problem Solving	A case study of reality	Analyze a field problem and propose realistic solutions	3	9
Team Performance Appraisal	Field application + group supervision	Teamwork dynamics in the field	Collaborate within a field team	3	10
Comparative Report	Second Field Tour	Visit a different field site	Comparison of working methods in more than one location	3	11
+ Oral Assessment Supervisor Feedback	Group discussion	Interim Performance Appraisal	Review work steps and improve performance	3	12
Project + Presentation Practical Evaluation	Individual/group supervised implementation	Implement a small project or specific task	Integrated application of skill acquired on the job site	3	13
Delivery of the final report	Individual Writing + Academic Review	Preparation of the final report	Provide a comprehensive report on the field experience	3	14

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, oral, monthly, written exams, reports ... Etc.	
12. Learning and Teaching Resources	
No	Required textbooks (methodology, if any)
	Key references (sources)
There isn't any	Recommended supporting books and references (scientific journals, reports...)
	Electronic references, websites

Theoretical Course Description

1. Course Name:	
Aquaculture Engineering / Theoretical	
2. Course Code:	
C203	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Prof Dr Atheer H. Ali Email: atheer.hussain@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	• Provide information on cartilaginous fish groups, their history of emergence, and the discovery of their first fossils. • • Familiarity with the basics of ichthyology. • • The ability to distinguish cartilaginous fish from other fish groups. • • General diagnostic characteristics of sharks and their main groups. • • General diagnostic characteristics of elasmobranchs and rays and their main groups. • • Identify the orders of elasmobranchs and rays found in the region. • • The relationship of sharks to humans.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	History of Shark	General Introduction	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	The ancient sharks	**Review of extinct species**	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Third	2 hours	Six-gills shark	Primitive sharks	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Angel and saw sharks	Near distinct sharks	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fifth	2 hours	Orectolobiformes	Modern sharks	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Sixth	2 hours	Bull-headed shark	Modern sharks	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Lamniformes (Mackerel sharks)	Modern sharks	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Hound sharks	Modern sharks	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	Ground shark	Modern sharks	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Eleventh	2 hours	Electric rays and saw fishes	Near distinct rays	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Guitar and sting rays	Modern rays	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	The sharks and humans	Negative history of the sharks	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students'	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Nill
Main References (Sources)	FAO (2014). PELAGIC SHARKS AND RAYS Western Indian. 22pp. Michael G. Frisk (2010). Sharks and Their Relatives II: Biodiversity, Adaptive Physiology, and Conservation. Pp. 283-316.
Recommended Books and References (Scientific Journals, Reports...)	Ali, A. H.; Adday, T. K. and Khamees, N. R. (2018). Catalogue of marine fishes of Iraq. Biological and Applied Environmental Research, 2(2): 298-368.
Electronic References, Websites	https://fishbase.org

Practical Course Description

1. Course Name:	
Aquaculture Engineering / Practical	
2. Course Code:	
AQEN322	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Sadiq Jwad Muhammed	Email: sadiq.muhammed@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students the basic aspects of aquaculture farm design. • Teach students the basic aspects of aquaculture hatchery design. • Teach students the basic concepts of establishing and managing earthen ponds, cages, recirculating aquaculture system, aquaponics and biofloc systems. • Teach students the engineering aspects of automated feeding systems. • Teach students on the nature and types of basic materials and equipment used in aquaculture systems.
9. Teaching and Learning Strategies	

Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to identify the basic aspects of aquaculture engineering.	General introduction Review the most important engineering matters related to aquaculture farms.	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	3 hours	Students will be able to differentiate between production units in aquaculture based on density, control, location of culture, etc.	Classification of production units Review examples of production units according to classifications based on density, control, location of farming, etc.	• Practical lecture • Presentation • Group discussion	Quick test Students identify the appropriate type for a group of production units mentioned in the questions
Third	3 hours	Students will be able to design and construct earthen ponds and handle the equipment and supplies for them.	Design and construction of earthen ponds 1 Design ponds on paper or using computer programs. Determine the cross-section of the plug. Calculate the amounts of soil that need to be added or removed. Determine the area and method of constructing the fish collection pit, drainage gates, supply channels and their requirements. Review and identify the equipment used in supplying and draining water. Review and identify the equipment used in aerating the ponds. Calculate the amounts of water needed and the time period for filling and draining the ponds.	• Practical lecture • Presentation • Group discussion	Solving practical problems
Fourth	3 hours	Students will be able to design and construct earthen ponds.	Design and construction of earthen ponds 2 Field visit to the fish ponds at the Al-Hartha Station farm or to one of the fish farms in the governorate.	• Explanation by the subject teacher • Explanation by the farm management	Discussion between students and between them and the subject teacher or farm management
Fifth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 1 Choose the appropriate location for the cages and the conditions that must be met. Review the materials used in the manufacture of cages and the advantages and disadvantages of each. Learn about the methods of constructing cages and the tools used in them. Determine the culture densities that can be used depending on the water specifications, location and type of fish.	• Practical lecture • Viewing samples of materials and equipment • Performing calculations using mathematical methods	Solving practical problems

Sixth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 2 Field visit to one of the cage farm sites in the governorate. Or practical application to create miniature model cages.	• Explanation by the subject teacher • Explanation by the farm management in the event of a field visit	Discussion between students and between them and the subject teacher or farm management in the event of a field visit or evaluation of models prepared by students
Seventh	3 hours	None	First monthly exam	None	None
Eighth	3 hours	Students will be able to identify the materials used and how to handle them for recirculating aquaculture system.	Design and construction of recirculating aquaculture system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, calculate culture densities.	• Practical lecture • Presentation • Video	Discussion and oral questions
Ninth	3 hours	Students will be able to identify the basics of designing and constructing an aquaponic system.	Design and construction of an aquaponic system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, types of plant culture platforms and materials used in them, calculate fish and plant culture densities and their types within the system.	• Practical lecture • Presentation • Video	Discussion and oral questions
Tenth	3 hours	Students will be able to identify the basics of operating a biofloc system.	Operation of the biofloc system Identify the equipment and tools used in the system. Identify the microorganisms used and how to prepare them for addition to the system. Identify the methods used to monitor water properties and microorganism densities within the system. Field visit to the department's aquaponics system and compare it with the closed system and the biofloc system.	• Practical lecture • Presentation • Video	A report discussing the system that is most suitable for the local environment and the most feasible for application and use among closed, aquaponic and biofloc farming systems locally
Eleventh	3 hours	Students will be able to identify the engineering aspects of automatic feeding systems.	Automated feeding systems Learn about modern automated feeding systems and the basics of their work and the materials and techniques used in their manufacture and operation.	• Practical lecture • Presentation • Video	Discussion and oral questions

Twelfth	3 hours	Students will be able to identify methods and equipment for transporting live fish.	Live fish transport Learn about the methods of transporting live fish and the equipment and supplies related to them and their differences according to the type, size and number of fish transported.	• Practical lecture • Presentation • Video	Assigning students to transport a group of live fish by different means
Thirteenth	3 hours	Students will be able to learn the basics of monitoring devices and follow up on the specifications of the water used for cultivation.	Devices and monitoring Learn about the basic components of measuring devices, review water specification measuring devices, water speed and quantity measuring devices, water pressure loss and leakage measuring devices, water level determination devices, fish counting devices, system monitoring equipment and software, and how to use each one.	• Practical lecture • Presentation • Video	Discussion and oral questions
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering,
Electronic References, Websites	https://www.fao.org/fishery/ar

Theoretical Course Description

1. Course Name:	
Aquaculture Engineering / Theoretical	
2. Course Code:	
C203	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Prof Dr Atheer H. Ali Email: atheer.hussain@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	• Learn the basics of fish classification, their morphological and anatomical characteristics, and their biological activities. • Learn the basics of collecting samples of fish eggs, larvae, and adults for study. • The student gains initial theoretical and practical experience working with fish and methods of propagation, breeding, and fishing. • Analytical skills that enable the student to work in agricultural directorates and public or private hatcheries. • Employability and self-development skills that enable the student to compete with others in the job market.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Enabling students to gain knowledge and understanding of ichthyology.	General Introduction	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Provide information about the main fish groups, their body systems and various organs.	The main groups of the fishes	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Third	2 hours	Skeletal system, nervous system, urinary system, reproductive system, and respiratory system	Body systems	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Circulatory system, digestive system, and muscular system	Body systems (Continue)	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fifth	2 hours	Sharks	Chondrichthyes (Selagi)	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Sixth	2 hours	Rays and Skates	Chondrichthyes (Selagi)	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Types of teeth, mouth shapes, and gill structure	Teleostei	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Anguiliformes to Codiformes.	Teleostei	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	Codiformes to Syngnathiformes.	Teleostei	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Eleventh	2 hours	Scorpaeniformes to Perciformes	Teleostei	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Scaridae (Parrot fishes) to Molidae Sun Fish	Teleostei	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Freshwater fishes in Iraq	Teleostei	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Ahmed, H. A. 1991. Icthyology
Main References (Sources)	Carpenter, K.E., Krupp, F., Jones, D.A. and Zajonz, U. (1997). Living marine resources of Kuwait, Eastern Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. FAO Species identification field guide for fishery purposes, FAO, Rome. viii + 293 pp., XVII pls.
Recommended Books and References (Scientific Journals, Reports...)	Ali, A. H.; Adday, T. K. and Khamees, N. R. (2018). Catalogue of
Electronic References, Websites	https://fishbase.org

Practical Course Description

1. Course Name:	
Aquaculture Engineering / Practical	
2. Course Code:	
AQEN322	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Sadiq Jwad Muhammed	Email: sadiq.muhammed@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students the basic aspects of aquaculture farm design. • Teach students the basic aspects of aquaculture hatchery design. • Teach students the basic concepts of establishing and managing earthen ponds, cages, recirculating aquaculture system, aquaponics and biofloc systems. • Teach students the engineering aspects of automated feeding systems. • Teach students on the nature and types of basic materials and equipment used in aquaculture systems.
9. Teaching and Learning Strategies	

Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to identify the basic aspects of aquaculture engineering.	General introduction Review the most important engineering matters related to aquaculture farms.	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	3 hours	Students will be able to differentiate between production units in aquaculture based on density, control, location of culture, etc.	Classification of production units Review examples of production units according to classifications based on density, control, location of farming, etc.	• Practical lecture • Presentation • Group discussion	Quick test Students identify the appropriate type for a group of production units mentioned in the questions
Third	3 hours	Students will be able to design and construct earthen ponds and handle the equipment and supplies for them.	Design and construction of earthen ponds 1 Design ponds on paper or using computer programs. Determine the cross-section of the plug. Calculate the amounts of soil that need to be added or removed. Determine the area and method of constructing the fish collection pit, drainage gates, supply channels and their requirements. Review and identify the equipment used in supplying and draining water. Review and identify the equipment used in aerating the ponds. Calculate the amounts of water needed and the time period for filling and draining the ponds.	• Practical lecture • Presentation • Group discussion	Solving practical problems
Fourth	3 hours	Students will be able to design and construct earthen ponds.	Design and construction of earthen ponds 2 Field visit to the fish ponds at the Al-Hartha Station farm or to one of the fish farms in the governorate.	• Explanation by the subject teacher • Explanation by the farm management	Discussion between students and between them and the subject teacher or farm management
Fifth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 1 Choose the appropriate location for the cages and the conditions that must be met. Review the materials used in the manufacture of cages and the advantages and disadvantages of each. Learn about the methods of constructing cages and the tools used in them. Determine the culture densities that can be used depending on the water specifications, location and type of fish.	• Practical lecture • Viewing samples of materials and equipment • Performing calculations using mathematical methods	Solving practical problems

Sixth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 2 Field visit to one of the cage farm sites in the governorate. Or practical application to create miniature model cages.	• Explanation by the subject teacher • Explanation by the farm management in the event of a field visit	Discussion between students and between them and the subject teacher or farm management in the event of a field visit or evaluation of models prepared by students
Seventh	3 hours	None	First monthly exam	None	None
Eighth	3 hours	Students will be able to identify the materials used and how to handle them for recirculating aquaculture system.	Design and construction of recirculating aquaculture system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, calculate culture densities.	• Practical lecture • Presentation • Video	Discussion and oral questions
Ninth	3 hours	Students will be able to identify the basics of designing and constructing an aquaponic system.	Design and construction of an aquaponic system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, types of plant culture platforms and materials used in them, calculate fish and plant culture densities and their types within the system.	• Practical lecture • Presentation • Video	Discussion and oral questions
Tenth	3 hours	Students will be able to identify the basics of operating a biofloc system.	Operation of the biofloc system Identify the equipment and tools used in the system. Identify the microorganisms used and how to prepare them for addition to the system. Identify the methods used to monitor water properties and microorganism densities within the system. Field visit to the department's aquaponics system and compare it with the closed system and the biofloc system.	• Practical lecture • Presentation • Video	A report discussing the system that is most suitable for the local environment and the most feasible for application and use among closed, aquaponic and biofloc farming systems locally
Eleventh	3 hours	Students will be able to identify the engineering aspects of automatic feeding systems.	Automated feeding systems Learn about modern automated feeding systems and the basics of their work and the materials and techniques used in their manufacture and operation.	• Practical lecture • Presentation • Video	Discussion and oral questions

Twelfth	3 hours	Students will be able to identify methods and equipment for transporting live fish.	Live fish transport Learn about the methods of transporting live fish and the equipment and supplies related to them and their differences according to the type, size and number of fish transported.	• Practical lecture • Presentation • Video	Assigning students to transport a group of live fish by different means
Thirteenth	3 hours	Students will be able to learn the basics of monitoring devices and follow up on the specifications of the water used for cultivation.	Devices and monitoring Learn about the basic components of measuring devices, review water specification measuring devices, water speed and quantity measuring devices, water pressure loss and leakage measuring devices, water level determination devices, fish counting devices, system monitoring equipment and software, and how to use each one.	• Practical lecture • Presentation • Video	Discussion and oral questions
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering,
Electronic References, Websites	https://www.fao.org/fishery/ar

Theoretical Course Description

1. Course Name:	
Biostatistics / Theoretical	
2. Course Code:	
BIOS220	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week (30 hours per semester) / 2 units (2 units)	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Riyadh Adnan Irmayla	Email: riyadh.irmayla@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	● Introducing students to basic biostatistical concepts. ● Developing data collection, organization, and presentation skills. ● Interpretation and analysis of statistical data. ● Learn the principles of statistical inference. ● Acquire skills in using statistics in agricultural research. ● Promote critical thinking in interpreting scientific findings
9. Teaching and Learning Strategies	
Strategy	● Theoretical lectures in classrooms. ● Presentations and video materials. ● Group discussions. ● Problem-based learning, inquiry and brainstorming. ● Report and project-based learning.
10. Course Structure	

Week	Hours	Required learning outcomes	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the basic concepts of biostatistics. ✓ Distinguish between data types. ✓ Classifies statistical variables. ✓ Explains the importance of statistics in scientific research. ✓ Recognizes basic statistical symbols. ✓ Apply the principles of data collection in a scientific and systematic manner.	**Introduction, Nature of Data and Statistical Symbols**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Second	2 hours	**By the end of this lesson, the student will be able to:** ✓ Organize raw data into frequency tables correctly. ✓ Classification of types of statistical tables according to the nature of the data. ✓ Use symbols and headings accurately when preparing tables. ✓ Present the results in an organized and clear manner that makes it easier for the reader to understand the information.	**Tabular and Graphical Presentation**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Third	2 hours	**By the end of this lesson, the student will be able to:** ✓ Define measures of central tendency and understand their importance in summarizing statistical data. ✓ Distinguish between types of central tendency measures. ✓ Choosing the appropriate central tendency measure based on the nature of the data and the extent to which it is affected by extreme values. ✓ Analyze the differences between the measures and conclude how well they represent the data. ✓ Interpret the results of the central tendency measures and relate them to the behavior and trends of the data. ✓ Solve real-world statistical problems using appropriate measures of central tendency.	**Measures of Central Tendency**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Fourth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of measures of dispersion or variation and their importance in describing the spread of data around measures of centering. ✓ Distinguish between types of dispersion measures ✓ Interpret the results of dispersion measures and relate them to the degree of homogeneity or variance of the data. ✓ Comparison of two or more groups using measures of dispersion to determine how spread out the data is in each group. ✓ Applying dispersion concepts in analyzing the results of research and practical studies. ✓ Relate measures of dispersion to measures of centering to understand the nature of data distribution in a comprehensive manner.	**Measures of Dispersion or Variation**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test
Fifth	2 hours	None	**First Monthly Exam**	None	None
Sixth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Define the concepts of permutations and combinations and distinguish between them in terms of usage and meaning. ✓ Calculate the number of permutations and the number of combinations. ✓ Applying mathematical formulas for permutations and combinations. ✓ Solve applied problems involving permutations (ordering elements) or combinations (selecting elements out of order). ✓ Using permutations and combinations to solve agricultural problems. ✓ Interpretation of results in the context of agricultural problems.	**Permutations and Combinations**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Seventh	2 hours	**By the end of this lesson, the student will be able to:** ✓ Define the concept of probability and understand its relationship to statistics and mathematics. ✓ Distinguish between types of possibilities. ✓ Correctly define the sample space for different events. ✓ Analyze problems related to conditional probability and understand the independence of events. ✓ Using probability theory in biostatistics applications.	**Probability Theory**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Eighth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Define the concept of correlation and its importance in analyzing the relationship between two variables. ✓ Distinguish between types of association. ✓ Calculate Pearson's correlation coefficient. ✓ Interpret the correlation coefficient value in terms of strength (weak, medium, strong) and direction (positive or negative). ✓ Distinguish between correlation and causation and explain that the presence of a correlation does not necessarily mean a causal relationship. ✓ Evaluate correlation results and relate them to real-world applications in agricultural sciences.	**Correlation**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Ninth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of the concept of regression and its importance in studying the relationship between two variables. ✓ Distinguish between correlation and regression in terms of concept and usage. ✓ Extract the equation of a simple regression line for a set of data. ✓ Interpret the meanings of the regression coefficient in the context of the relationship between the two variables. ✓ Plot the regression line on the graph using the calculated equation. ✓ Predicting the values of one variable based on the value of the other variable using a regression equation. ✓ Analyze the quality of the model using the coefficient of determination R^2 or the least squares method to understand the extent to which the independent variable explains the dependent variable. ✓ Recognize the limitations of applying simple regression and when it is appropriate or not appropriate for analysis.	**Regression**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test
Tenth	2 hours	None	**Second Monthly Exam**	None	None

Eleventh	2 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of hypothesis testing and its importance in making statistical decisions. ✓ Distinguish between the null hypothesis (H_0) and the alternative hypothesis (H_1) and understand the role of each in statistical testing. ✓ Formulate hypotheses correctly based on the problem or research question. ✓ Choosing the appropriate statistical test according to the type of data (such as *t*- test, X^2 test, *F* -test, etc.). ✓ Determine levels of statistical significance (α) and interpret their meaning in the context of the test. ✓ Identify the critical region and decide whether to accept or reject the null hypothesis. ✓ Interpret the results of hypothesis testing in a correct and scientific manner. ✓ Identify statistical errors (Type I and Type II errors) and understand their impact on decision outcomes. ✓ Apply hypothesis testing in real-world, practical situations such as agricultural research.	**Test of Hypothesis**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Twelfth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Distinguish between types of *t* -tests such as: One - Sample *t* - test and *t* -test for two independent samples (Independent samples *t* -test) and (Paired samples *t* - test) ✓ Determine when to use a *t*-test based on the nature of the data and the research question. ✓ Correctly formulate the null and alternative hypotheses in the context of a *t* -test. ✓ Calculate the *t* -test statistic using appropriate formulas for each case. ✓ Compare the calculated value with the table value to make a statistical decision. ✓ Interpret the results of the *t* -test and relate them to the scientific or research context of the problem being studied. ✓ Apply *t* -test in agricultural problems and analyze the results accurately.	***t* - test**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Thirteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of the chi-square test and explanation of its different types (test of independence and test of goodness of fit). ✓ Identify statistical situations in which the chi-square test is required. ✓ Correctly formulate statistical hypotheses associated with the chi-square test. ✓ Calculate expected frequencies and use them in the chi-square test. ✓ Apply the mathematical formula for the chi-square test to calculate the statistical value. ✓ Determine the degrees of freedom associated with the test and use statistical tables to draw conclusions. ✓ Make the appropriate statistical decision (accept or reject the null hypothesis) based on the results. ✓ Interpret and analyze the results in a scientific and systematic manner.	**Chi-square test**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Fourteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ *F* test is defined and explained for its purpose in comparing more than two variances. ✓ Identify appropriate situations to use the *F* -test (one-way ANOVA). ✓ Correctly formulate statistical hypotheses associated with the *F*- test. ✓ Calculates the *F* -test value using sample data and appropriate equations. ✓ Specifies the degrees of freedom for both the parameters and the error. ✓ Uses statistical tables to derive critical values for the *F* test. ✓ The correct statistical decision is made about accepting or rejecting the null hypothesis based on the calculated *F* value. ✓ Interprets the results of the *F* -test in a scientific manner related to the context of the study.	***F*- test**	✓ *Theoretical lecture* ✓ *Presentation* ✓ *Group discussion* ✓ *Examples and solutions* ✓ *Interpretation of results*	✓ *Participate in solving examples* ✓ *Quick test* ✓ *Homework*

Fifteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the concept of artificial intelligence and its role in developing biostatistical applications. ✓ Distinguish between traditional and AI-assisted methods in data analysis. ✓ Identify common AI applications in statistical fields. ✓ Evaluate the importance of AI in improving the quality of prediction and decision-making.	**Artificial Intelligence AI General Review**	✓ Solve various example ✓ Group discussion ✓ Answering students' inquiries	None

11. Course Evaluation

Distribution of the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly written exams, reports, etc.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Al-Rawi, K.M. (1989). Introduction to Statistics, 469 pp.
Main References (Sources)	
Recommended Books and References (Scientific Journals, Reports...)	
Electronic References, Websites	

Practical Course Description

The practical part is a practical application of the theoretical part through examples about statistical applications for agricultural experiments.

1. Course Name:	
Biostatistics / Practical	
2. Course Code:	
BIOS220	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in the laboratory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Three hours per week (45 hours per semester) / One and a half units (one and a half units)	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Entisar S. Hashim	Email: intisar.hussain@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Introducing students to basic biostatistical concepts. • Developing data collection, organization, and presentation skills. • Interpretation and analysis of statistical data. • Learn the principles of statistical inference. • Acquire skills in using statistics in agricultural research. • Promote critical thinking in interpreting scientific findings
9. Teaching and Learning Strategies	
Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning outcomes	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the basic concepts of biostatistics. ✓ Distinguish between data types. ✓ Classifies statistical variables. ✓ Explains the importance of statistics in scientific research. ✓ Recognizes basic statistical symbols. ✓ Apply the principles of data collection in a scientific and systematic manner	**Introduction, Nature of Data and Statistical Symbols**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Second	3 hours	**By the end of this lesson, the student will be able to:** ✓ Organize raw data into frequency tables correctly. ✓ Classification of types of statistical tables according to the nature of the data. ✓ Use symbols and headings accurately when preparing tables. ✓ Present the results in an organized and clear manner that makes it easier for the reader to understand the information.	**Tabular and Graphical Presentation**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Third	3 hours	**By the end of this lesson, the student will be able to:** ✓ Define measures of central tendency and understand their importance in summarizing statistical data. ✓ Distinguish between types of central tendency measures. ✓ Choosing the appropriate central tendency measure based on the nature of the data and the extent to which it is affected by extreme values. ✓ Analyze the differences between the measures and conclude how well they represent the data. ✓ Interpret the results of the central tendency measures and relate them to the behavior and trends of the data. ✓ Solve real-world statistical problems using appropriate measures of central tendency.	**Measures of Central Tendency**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Fourth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of measures of dispersion or variation and their importance in describing the spread of data around measures of centering. ✓ Distinguish between types of dispersion measures ✓ Interpret the results of dispersion measures and relate them to the degree of homogeneity or variance of the data. ✓ Comparison of two or more groups using measures of dispersion to determine how spread out the data is in each group. ✓ Applying dispersion concepts in analyzing the results of research and practical studies. ✓ Relate measures of dispersion to measures of centering to understand the nature of data distribution in a comprehensive manner.	**Measures of Dispersion or Variation**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test
Fifth	3 hours	None	**First Monthly Exam**	None	None
Sixth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Define the concepts of permutations and combinations and distinguish between them in terms of usage and meaning. ✓ Calculate the number of permutations and the number of combinations. ✓ Applying mathematical formulas for permutations and combinations. ✓ Solve applied problems involving permutations (ordering elements) or combinations (selecting elements out of order). ✓ Using permutations and combinations to solve agricultural problems. ✓ Interpretation of results in the context of agricultural problems.	**Permutations and Combinations**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Seventh	3 hours	**By the end of this lesson, the student will be able to:** ✓ Define the concept of probability and understand its relationship to statistics and mathematics. ✓ Distinguish between types of possibilities. ✓ Correctly define the sample space for different events. ✓ Analyze problems related to conditional probability and understand the independence of events. ✓ Using probability theory in biostatistics applications.	**Probability Theory**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Eighth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Define the concept of correlation and its importance in analyzing the relationship between two variables. ✓ Distinguish between types of association. ✓ Calculate Pearson's correlation coefficient. ✓ Interpret the correlation coefficient value in terms of strength (weak, medium, strong) and direction (positive or negative). ✓ Distinguish between correlation and causation and explain that the presence of a correlation does not necessarily mean a causal relationship. ✓ Evaluate correlation results and relate them to real-world applications in agricultural sciences.	**Correlation**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Ninth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of the concept of regression and its importance in studying the relationship between two variables. ✓ Distinguish between correlation and regression in terms of concept and usage. ✓ Extract the equation of a simple regression line for a set of data. ✓ Interpret the meanings of the regression coefficient in the context of the relationship between the two variables. ✓ Plot the regression line on the graph using the calculated equation. ✓ Predicting the values of one variable based on the value of the other variable using a regression equation. ✓ Analyze the quality of the model using the coefficient of determination R^2 or the least squares method to understand the extent to which the independent variable explains the dependent variable. ✓ Recognize the limitations of applying simple regression and when it is appropriate or not appropriate for analysis.	**Regression**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test
Tenth	3 hours	None	**Second Monthly Exam**	None	None

Eleventh	3 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of hypothesis testing and its importance in making statistical decisions. ✓ Distinguish between the null hypothesis (H_0) and the alternative hypothesis (H_1) and understand the role of each in statistical testing. ✓ Formulate hypotheses correctly based on the problem or research question. ✓ Choosing the appropriate statistical test according to the type of data (such as *t*- test, X^2 test, *F* -test, etc.). ✓ Determine levels of statistical significance (α) and interpret their meaning in the context of the test. ✓ Identify the critical region and decide whether to accept or reject the null hypothesis. ✓ Interpret the results of hypothesis testing in a correct and scientific manner. ✓ Identify statistical errors (Type I and Type II errors) and understand their impact on decision outcomes. ✓ Apply hypothesis testing in real-world, practical situations such as agricultural research.	**Test of Hypothesis**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Twelfth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Distinguish between types of *t* -tests such as: One - Sample *t* - test and *t* -test for two independent samples (Independent samples *t* -test) and (Paired samples *t* - test) ✓ Determine when to use a *t*-test based on the nature of the data and the research question. ✓ Correctly formulate the null and alternative hypotheses in the context of a *t* -test. ✓ Calculate the *t* -test statistic using appropriate formulas for each case. ✓ Compare the calculated value with the table value to make a statistical decision. ✓ Interpret the results of the *t* -test and relate them to the scientific or research context of the problem being studied. ✓ Apply *t* -test in agricultural problems and analyze the results accurately.	***t* - test**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Thirteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Definition of the chi-square test and explanation of its different types (test of independence and test of goodness of fit). ✓ Identify statistical situations in which the chi-square test is required. ✓ Correctly formulate statistical hypotheses associated with the chi-square test. ✓ Calculate expected frequencies and use them in the chi-square test. ✓ Apply the mathematical formula for the chi-square test to calculate the statistical value. ✓ Determine the degrees of freedom associated with the test and use statistical tables to draw conclusions. ✓ Make the appropriate statistical decision (accept or reject the null hypothesis) based on the results. ✓ Interpret and analyze the results in a scientific and systematic manner.	**Chi-square test**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Fourteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ *F* test is defined and explained for its purpose in comparing more than two variances. ✓ Identify appropriate situations to use the *F* -test (one-way ANOVA). ✓ Correctly formulate statistical hypotheses associated with the *F*- test. ✓ Calculates the *F* -test value using sample data and appropriate equations. ✓ Specifies the degrees of freedom for both the parameters and the error. ✓ Uses statistical tables to derive critical values for the *F* test. ✓ The correct statistical decision is made about accepting or rejecting the null hypothesis based on the calculated *F* value. ✓ Interprets the results of the F -test in a scientific manner related to the context of the study.	***F*- test**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Fifteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the concept of artificial intelligence and its role in developing biostatistical applications. ✓ Distinguish between traditional and AI-assisted methods in data analysis. ✓ Identify common AI applications in statistical fields. ✓ Evaluate the importance of AI in improving the quality of prediction and decision-making.	**Artificial Intelligence AI General Review**	✓ Solve various example ✓ Group discussion ✓ Answering students' inquiries	None

11. Course Evaluation

Distribution of the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly written exams, reports, etc.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Al-Rawi, K.M. (1989). Introduction to Statistics, 469 pp.
Main References (Sources)	
Recommended Books and References (Scientific Journals, Reports...)	
Electronic References, Websites	

Theoretical Course Description

1. Course Name:	
Fish Feeding Principals / Theoretical	
2. Course Code:	
FINU218	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Salah M. Najim	Email: salah.mahdi@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• This course aims to prepare students to understand the concepts, skills and ability to work in the field of fish farming and nutrition with theoretical and applied knowledge regarding the subject of fish nutrition principles. • Obtaining the skills required for post-graduation (postgraduate studies). • Applying for external tests by local/regional/international bodies. • Providing information on the basic aspects of fish nutrition, especially in the field of fish farming. • The ability to deal with feeding methods and techniques. • Using modern methods in fish manufacturing and feeding aquaculture systems.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Students will be able to identify the basic aspects of fish nutrition.	General Introduction	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Explain and clarify the most Important nutrients in fish nutrition.	Nutrients	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used production units
Third	2 hours	Explain and clarify the most Important proteins and amino acids, their	Proteins and amino acids	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Explain and clarify the most Important fats and fatty acids, their	Fats and fatty acids	• Theoretical lecture • Presentation • Group discussion Video	Earth pond design project
Fifth	2 hours	Explain and clarify the general properties of carbohydrates and its importance.	Carbohydrates	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Sixth	2 hours	Introduce students to the types of vitamins and their classifications.	Vitamins	• Theoretical lecture • Presentation • Group discussion Video	Cage design project
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Introduce students to the types of minerals and their classifications.	Minerals	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Detailed explanation on energy types and importance.	Energy	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	Explain digestion methods and variation between fish.	Digestion	• Theoretical lecture • Presentation • Group discussion Video	Comparative report between closed culture systems, aquaponics and biofloc
Eleventh	2 hours	Explanation and details on metabolism in fish.	Metabolism	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Introducing the types of live food and its importance.	Live Food	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Introducing the types of artificial food and its importance.	Artificial Food	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Fish Food and Feeding. T.A. Ahmad & Nader A. Salman. 1982.
Main References (Sources)	1- Fish Nutrition. Halver &Hardy (2002). 2- Food Intake in Fish. Houlihan and Boujard & Jobling, (2001) 3- Nutrition of pond fishes. Hepher (1988)

Recommended Books and References (Scientific Journals, Reports...)	1- Nutrient Requirements and Feeding of Finfish for Aquaculture. WEBSTER & LIM (2002). 2- On-farm feeding and feed management in aquaculture. Hasan& New (2013). 3- Feed and Feeding Practices in Aquaculture. Davis (2015). Narendra Publishing House, New Delhi.
Electronic References, Websites	https://www.fao.org/fishery/ar

Practical Course Description

1. Course Name:
Aquaculture Engineering / Practical
2. Course Code:
AQEN322
3. Semester / Year:
Second Semester / 2024-2025
4. Description Preparation Date:
02/01/2025
5. Available Attendance Forms:
Attendance in the laboratory and field visits
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours per week / 1.5 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Sadiq Jwad Muhammed Email: sadiq.muhammed@uobasrah.edu.iq
8. Course Objectives

Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students the basic aspects of aquaculture farm design. • Teach students the basic aspects of aquaculture hatchery design. • Teach students the basic concepts of establishing and managing earthen ponds, cages, recirculating aquaculture system, aquaponics and biofloc systems. • Teach students the engineering aspects of automated feeding systems. • Teach students on the nature and types of basic materials and equipment used in aquaculture systems.

9. Teaching and Learning Strategies

Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to identify the basic aspects of aquaculture engineering.	General introduction Review the most important engineering matters related to aquaculture farms.	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	3 hours	Students will be able to differentiate between production units in aquaculture based on density, control, location of culture, etc.	Classification of production units Review examples of production units according to classifications based on density, control, location of farming, etc.	• Practical lecture • Presentation • Group discussion	Quick test Students identify the appropriate type for a group of production units mentioned in the questions

Third	3 hours	Students will be able to design and construct earthen ponds and handle the equipment and supplies for them.	Design and construction of earthen ponds 1 Design ponds on paper or using computer programs. Determine the cross-section of the plug. Calculate the amounts of soil that need to be added or removed. Determine the area and method of constructing the fish collection pit, drainage gates, supply channels and their requirements. Review and identify the equipment used in supplying and draining water. Review and identify the equipment used in aerating the ponds. Calculate the amounts of water needed and the time period for filling and draining the ponds.	• Practical lecture • Presentation • Group discussion	Solving practical problems
Fourth	3 hours	Students will be able to design and construct earthen ponds.	Design and construction of earthen ponds 2 Field visit to the fish ponds at the Al-Hartha Station farm or to one of the fish farms in the governorate.	• Explanation by the subject teacher • Explanation by the farm management	Discussion between students and between them and the subject teacher or farm management
Fifth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 1 Choose the appropriate location for the cages and the conditions that must be met. Review the materials used in the manufacture of cages and the advantages and disadvantages of each. Learn about the methods of constructing cages and the tools used in them. Determine the culture densities that can be used depending on the water specifications, location and type of fish.	• Practical lecture • Viewing samples of materials and equipment • Performing calculations using mathematical methods	Solving practical problems
Sixth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 2 Field visit to one of the cage farm sites in the governorate. Or practical application to create miniature model cages.	• Explanation by the subject teacher • Explanation by the farm management in the event of a field visit	Discussion between students and between them and the subject teacher or farm management in the event of a field visit or evaluation of models prepared by students
Seventh	3 hours	None	First monthly exam	None	None
Eighth	3 hours	Students will be able to identify the materials used and how to handle them for recirculating aquaculture system.	Design and construction of recirculating aquaculture system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, calculate culture densities.	• Practical lecture • Presentation • Video	Discussion and oral questions

Ninth	3 hours	Students will be able to identify the basics of designing and constructing an aquaponic system.	Design and construction of an aquaponic system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, types of plant culture platforms and materials used in them, calculate fish and plant culture densities and their types within the system.	• Practical lecture • Presentation • Video	Discussion and oral questions
Tenth	3 hours	Students will be able to identify the basics of operating a biofloc system.	Operation of the biofloc system Identify the equipment and tools used in the system. Identify the microorganisms used and how to prepare them for addition to the system. Identify the methods used to monitor water properties and microorganism densities within the system. Field visit to the department's aquaponics system and compare it with the closed system and the biofloc system.	• Practical lecture • Presentation • Video	A report discussing the system that is most suitable for the local environment and the most feasible for application and use among closed, aquaponic and biofloc farming systems locally
Eleventh	3 hours	Students will be able to identify the engineering aspects of automatic feeding systems.	Automated feeding systems Learn about modern automated feeding systems and the basics of their work and the materials and techniques used in their manufacture and operation.	• Practical lecture • Presentation • Video	Discussion and oral questions
Twelfth	3 hours	Students will be able to identify methods and equipment for transporting live fish.	Live fish transport Learn about the methods of transporting live fish and the equipment and supplies related to them and their differences according to the type, size and number of fish transported.	• Practical lecture • Presentation • Video	Assigning students to transport a group of live fish by different means
Thirteenth	3 hours	Students will be able to learn the basics of monitoring devices and follow up on the specifications of the water used for cultivation.	Devices and monitoring Learn about the basic components of measuring devices, review water specification measuring devices, water speed and quantity measuring devices, water pressure loss and leakage measuring devices, water level determination devices, fish counting devices, system monitoring equipment and software, and how to use each one.	• Practical lecture • Presentation • Video	Discussion and oral questions
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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. 5 marks for attendance, participation and answering oral questions 5 marks for reports and projects 5 marks for the first monthly exam 5 marks for the second monthly exam 20 marks for the final exam 40 marks total 60 marks for the theoretical part

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering,
Electronic References, Websites	https://www.fao.org/fishery/ar

Theoretical Course Description

1. Course Name:	
Aquatic insects / Theoretical	
2. Course Code:	
AQIN213	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Moammed A, Salman	
8. Course Objectives	
Course Objectives	1-Enabling students to gain knowledge .and understanding of aquatic insects 2-Enabling students to gain knowledge and understanding of the interrelationship between insects, plants, and the environment. 3- Familiarizing students with laboratory work, the application of theoretical knowledge, and linking it to practical work..
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Introduce students to general information about the aquatic insects .	General introduction to the aquatic insects	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Introduce students to aquatic insects and their main divisions.	aquatic insects and their main divisions.	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used production units
Third	2 hours	Insect body parts...	Insect body parts. Head in insects, compound eyes , simple eyes, and antennae..	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Mouthparts in insects.	Mouthparts and feeding mechanism in insects.	• Theoretical lecture • Presentation • Group discussion Video	Earth pond design project
Fifth	2 hours	The thorax and their modifications	The thorax and legs and their modifications.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Sixth	2 hours	Wings in insects.	Wings and their modifications in insects..	• Theoretical lecture • Presentation • Group discussion Video	Cage design project
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Defining the importance of the relationship between aquatic insects and phytoplankton and	The relationship between aquatic insects and phytoplankton and zooplankton	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Orders of insects of aquatic environment .	. Orders of insects that living in aquatic environment	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	Ephemeroptera insects	Order of Ephemeroptera and their characteristics	• Theoretical lecture • Presentation • Group discussion Video	Comparative report between closed culture systems, aquaponics and biofloc
Eleventh	2 hours	Odonata insects	Order of Odonata and their characteristics	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Hemiptera. insects	Order of Hemiptera and their characteristics .	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Coleoptera insects	Order of Coleoptera and their characteristics	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	Diptera insects	Order of Diptera and their characteristics	None	None
Fifteenth	2 hours	None	Second Monthly Exam	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Principles of Entomology - Author: Mhady Ba-hassan
Recommended Books and References (Scientific Journals, Reports...)	Entomology - Author: Cedric Gilot,.
Electronic References, Websites	

Practical Course Description

1. Course Name:	
Aquatic insects / practical	
2. Course Code:	
AQIN213	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in the laboratory	
6. Number of Credit Hours (Total)/Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Mushreq Mezaal Hamad	Email: mushrq.dager@gmail.com
8. Course Objectives	
Course Objectives	• Explain the scientific material through a PowerPoint presentation. • 2- Explain the structure of the insect body, the function of each part, and the life cycle of insects of different species. • 3- Distinguish between the insect class and other classes through comparisons
9. Teaching and Learning Strategies	

Strategy	• **1. Teaching strategy using PowerPoint presentation** • **2. Teaching strategy using brainstorming** • **3. Teaching strategy using a series of laboratory notes**

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	. **Introducing students to general information about entomology**	**Entomology**	• **Explain the material** • **Presentation** • **Discussion**	**Daily, monthly and final exams**
Second	3 hours	. **Enabling students to differentiate between the classes of arthropods**	**General features of the phylum Arthropoda**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**
Third	3 hours	Enabling students to identify the tools needed to collect insects and the benefits of using each one.	**The most important tools needed for collecting insects**	• Explain the material • Presentation • View the models	**Daily, monthly and final exams**
Fourth	3 hours	**Students will be able to identify the parts of an insect's body and the appendages**	**External anatomy in insects**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**
Fifth	3 hours	**Enabling students to know the appendages that the head carries in insects and their benefits**	**The head and its appendages**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**

Sixth	3 hours	**Explanation and clarification of the structure of the mouth parts in insects and the modification of those parts**	**Mouth parts and their modifications**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**
Seventh	3 hours	None	First monthly exam	• None	None
Eighth	3 hours	**Enabling students to identify the benefits of antennae, the parts that make up an antennae, and the types of antennae.**	**Antennae**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**
Ninth	3 hours	**Explanation and clarification of the structure of the legs in insects and the types of leg modifications.**	**Leg modifications in insects**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**
Tenth	3 hours	**Explanation and clarification of the types of wing mutations**	**Wing modifications in insects**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**
Eleventh	3 hours	• **Enabling students to identify the types of appendages that the abdomen carries in insects.**	**Abdominal appendages in insects**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**

Twelfth	3 hours	**Explanation and clarification of the types of** Metamorphosis **or transformation in insects .**	Metamorphosis **in insects**	• **Explain the material** • **Presentation** • **View the models** •	**Daily, monthly and final exams**
Thirteenth	3 hours	**Enabling students to identify and distinguish between the types of larvae**	**Types of larvae in insects**	• **Explain the material** • **Presentation** • **View the models**	**Daily, monthly and final exams**
Fourteenth	3 hours	**Enabling students to identify and distinguish between the types of pupa**	**Types of larvae in insects**	• **Explain the material** • **Presentation View the models**	**Daily, monthly and final exams**
Fifteenth	3 hours	None	Second monthly exam	• None	None

11. Course Evaluation

Distribution of the score out of 100 according to the tasks assigned to the student, such as daily preparation, monthly, or written exams, attendance, etc.
5marks for attendance
5marks for Daily exams
5marks for the first monthly exam
5marks for the second monthly exam
20marks for the final exam
40marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Aquatic Insects Authored by Dr. Ali Abdul Hussein
Main References (Sources)	
Recommended Books and References (Scientific Journals, Reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name: *The crimes of the Baath regime– the seconed stage – for all Departments / College of Agricul ure - U*	
2. Course Code:	
3. Semester / Year:2023- 2024	
4. Description Preparation Date:2024	
5. Available Attendance Forms: In presence	
6. Number of Credit Hours (Total) / Number of Units (Total): 2/2	
7. Course Administrator's Name	
Name: widad salim mohammad Email:widad.mohammad@uobasrah.edu.iq.	
8. Course Objectives	
Course Objectives	**1- Talking about part of Iraq's contempor ary I went through, and the nature of the Baa h re period in Iraq.** **2- Highlighting the crimes of genocide an committed against the Iraqi people.**
9. Teaching and Learning Strategies	
Strategy	**The lesson includes (2) hours of theory and (3) hours of practical - the approved, and distributed over 15 we ks.**

10. Course Structure					
Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
1	2		Crimes of the Baath regime according to the Iraqi Supreme Criminal Court Law in 2005	An explanatory lecture with explanations and examples	Surprise tests a manage the lectu guidance from us, each course and m
2	2		The crimes of the Baath regime	An explanatory lecture with	Surprise tests a manage the lectu guidance from us,
3			Decisions issued by the Supreme Criminal Court	An explanatory lecture with	Surprise tests a manage the lectu guidance from us,
4			Psychological and social crimes and their	An explanatory lecture with	Surprise tests a manage the lectu guidance from us,
5			The Baathist regime's position on	An explanatory lecture with	Surprise tests a manage the lectu guidance from us,
6			Violations of Iraqi laws	An explanatory lecture with	Surprise tests a manage the lectu guidance from us,
7		exam	First-month exam		
8			Some decisions regarding political and	An explanatory lecture with	Surprise tests a manage the lectu guidance from us,
9			Prison and detention places of the Baath	An explanatory lecture with	Surprise tests a manage the lectu guidance from us,

10			**Environmental crimes of the Baath regime in Iraq**	**An explanatory lecture with**	**Surprise tests a manage the lectu guidance from us,**
11			**Military and radiation pollution, mines, and**	**An explanatory lecture with**	**Surprise tests a manage the lectu guidance from us,**
12			**Drying the marshes and bulldozing palm orchards, trees**	**An explanatory lecture with**	**Surprise tests a manage the lectu guidance from us,**
13			**Mass grave crimes**	**An explanatory lecture with**	**Surprise tests a manage the lectu guidance from us,**
14			**Chronological classification of genocide graves in Iraq for the**	**An explanatory lecture with**	**Surprise tests a manage the lectu guidance from us,**
15		**exam**	**Second month exam**		

11. Course Evaluation	
Distribution of the score out of 100 according to the tasks assigned to the student, such as monthly, or written exams, reports, etc.	
12. Learning and Teaching Sources	
Required textbooks (methodology, if any)	The crimes of the Baath regime in Iraq
Main references (sources)	1. The disintegration of the family and society in a 2. Hussein Aliwi Al-Zayadi, Dr. Abbas Atiya Al-Qu
Recommended supporting books and references (scientific journals, reports...)	Scientific journals
Electronic references, websites	Some research and articles on genetics

Theoretical Course Description

1. Course Name:	
Fish Biology	
2. Course Code:	
FSBI312	
3. Semester / Year: 2024_2025	
First semester/ 2024-2025	
4. Description Preparation Date:	
17/ 2/ 2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6 Number of Credit Hours (Total)/Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Rajaa abdali	Email: raja.abdali@uobasrah.edu.iq
8. Course Objectives	
Course Objectives Graduating students who are able to:	• **Working in the field of environmental sciences, they have theoretical and applied knowledge of the subject of Fish biology** • **Obtaining the skills required for a postgraduate plan (postgraduate studies).**
9. Teaching and Learning Strategies	
Strategy	**Students will learn how to conduct biological applications on fish**

10. Course Structure					
Week	**Hours**	**Required learning**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**
1	**2**	Introduce students to general information	Morphometric characteristics of fish	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
2	**2**	Introduce students to learn developing in	Life stages of fish	Theoretical l lectures + presentation methods +	Daily, monthly and final exams and
3	**2**	Know the growth	**Embryonic development in fish**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
4	**2**	Learn about natural food	**Food and feeding**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
5	**2**	Applications	Food analysis	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
6	**2**	none	First monthly exam	none	none
7	**2**	**Fish growth concepts**	**Age and Growth**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
8	**2**	**Reading age**	**Scales and back calculation**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
9	**2**	Fish **growth**	**Length-Weight Relationship and condition factor**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
10	**2**	**Reproduction methods**	**Reproduction**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and

11	**2**	**Egg production**	**Fecundity of fish**	Theoretical l lectures + presentation methods +	Daily, monthly and final exams and
12	**2**	**Fish aggregations**	**Population of fishes**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
13	**2**	**Good management**	**Improve productivity**	Theoretical lectures + presentation methods +	Daily, monthly and final exams and
14	**2**	none	First monthly exam	none	none
15	**2**	none	General review	• Group • discussion Answering students'	none

Distribution of 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 Sources

Required Textbooks (Curricular Books, If Any)	**Biology of fish , D. Hashim**
Main References (Sources)	**Environmental and biological research of fish**
Recommended Books and References (Scientific Journals, Reports)	**Published research and theses**
Electronic References, Websites	**Making presentations**

Practical Course Description

1. Course Name:
Fish biology / Practical
2. Course Code:
FSBI312
3. Semester / Year:

Second Semester / 2024-2025	
4. Description Preparation Date:	
17/02/2025	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total)/Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name Rajaa abdali Email: raja.abdali@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	• Teach students the biological aspects of aquaculture systems. • Teach students the basic aspects of biological relationships. • Teach students how to link relationships with graphics • Teach students anatomy of the internal fish organs • Teach students aspects of knowing the type of food that fish eat • Teach students the nature and types of fish reproduction.
9. Teaching and Learning Strategies	
Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • .
10. Course Structure	

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method

First	3 hours	Determine of morphometric characteristics	Morphometric characteristics of fish	practical lectures + presentation methods +	Daily, monthly and final exams and
Second	3 hours	Determine of meristic characteristics	**Study meristic measurements**	practical lectures + presentation methods +	Daily, monthly and final exams and
Third	3 hours	**Learning of create graphics**	**Linking biological relationships**	practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
Fourth	3 hours	**Measuring the length and weight of fish**	**Length – weight relationship**	practical lectures + presentation methods +	Daily, monthly and final exams and
Fifth	3 hours	**Growth and health of fish**	**Condition factor**	practical lectures + presentation methods + dialogue	Daily, monthly and final exams and daily
Sixth	3 hours	Students will learning fish breeding.	Food and feeding	practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
Seventh	3 hours	None	First monthly exam	none	none
Eighth	3 hours	**Age determines**	**Age and growth of fish**	practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports

Ninth	3 hours	Determine the length of fish in previous ages	**Scales and back calculation**	practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
Tenth	3 hours	**Reproductive Fish species**	**Fish reproduction**	practical lectures + presentation methods + dialogue and	Daily, monthly and final exams and daily reports
Eleventh	3 hours	**Sex identification**	**Maturation cycle**	practical lectures + presentation methods +	Daily, monthly and final exams and
Twelfth	3 hours	**Fish productivity**	**Fish fecundity**	practical lectures + presentation methods + dialogue and	Daily, monthly and final exams and daily reports
Thirteenth	3 hours	None	Second monthly exam	none	none
Fourteenth	3 hours	None	Second monthly exam	none	none
Fifteenth	3 hours	None	General review	• Group • discussion	none
11. Course Evaluation					

Distribution of 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. 5marks for attendance, participation and answering oral questions 5marks for reports and projects 5marks for the first monthly exam 5marks for the second monthly exam 20marks for the final exam 40marks total 60 marks for the theoretical part	
12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	**Biology of fish , D. Hashim**
Main References (Sources)	**Environmental and biological research of fish**
Recommended Books and References (Scientific Journals, Reports)	**Published research and theses**
Electronic References, Websites	**Making presentations**

Course Description Form

1. Course Name:	
Genetic	
2. Course Code:	
FSGN320	
3. Semester / Year:	
Second semester/ 2025	
4. Description Preparation Date:	
17 /2/ 2025	
5. Available Attendance Forms:	
Full time (theoretical lecture/practical lecture)	
6. Number of Credit Hours (Total)/Number of Units (Total)	
2 hours per week for 15 weeks/ 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Rajaa abdali	Email:abdalirajaa@yahoo.com
8. Course Objectives	
Course Objectives Graduating students who are able to:	• **Working in the field of environmental sciences, they have theoretical and applied knowledge of the subject of genetic** • **Obtaining the skills required for a postgraduate plan (postgraduate studies).** • **Thinking and analysis skills that enable access to knowledge of Genetic in fish.**
9. Teaching and Learning Strategies	
Strategy	**Students will learn how to performgeneic applications on fish**

10. Course Structure					
Week	**Hours**	**Required learning**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**
1	**2**	Identify genetic traits	Definition of genetics	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
2	**2**	Knowledge of genetic foundations	Basics of genetics	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
3	**2**	Learn about the law	**The first law of mandal**	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
4	**2**	Learn about the law	**The second law of mandal**	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
5	**2**	Blood types	**Inheritance of blood groups**	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
6	**2**	Applications	Genetic Engineering	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
7	**2**	None	Second Monthly Exam	None	None
8	**2**	**Concepts of procreation**	Quantitative genetic	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
9	**2**	**Inheritance of traits**	**Genetic Mutations**	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
10	**2**	Improve quality	Election	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports

11	**2**	**Reproduction methods**	**Biotechnology**	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
12	**2**	**Increase in production**	**Basics of genetics in fish**	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
13	**2**	**Gathering of aquatic organisms**	**Characterized reproduction in aquatic organisms**	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
14	**2**	None	Second Monthly Exam	None	None
15	**2**	None	General Review	• Group discussion • Answering students'	None

Distribution of 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 Sources

Required Textbooks (Curricular Books, If Any)	**Basics of genetics** **Genetics and biotechnology in fish**
Main References (Sources)	**Lectures on genetics**
Recommended Books and References (Scientific Journals, Reports)	
Electronic References, Websites	**Making presentations**

Practical Course Description

1. Course Name:
Genetic / Practical
2. Course Code:
FSGN320
3. Semester / Year:

Second Semester / 2024-2025
4. Description Preparation Date:
02/01/2025
5. Available Attendance Forms:
Presence inside the laboratory and field visits
6. Number of Credit Hours (Total)/Number of Units (Total)
3 hours per week / 1.5 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Furat kassim jassim E mail: furat.jassim@uobasrah.edu.iq
8. Course Objectives

Course Objectives	• Genetic theories play an important rol in fisheries enhancement programs. • Genetically modified fish have great potential to increase fish farm production • Genetics is an important science in knowing how to promote health and prevent disease.

9. Teaching and Learning Strategies	
Strategy	• Video clips • Presentation • **Solve problems**

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method

First	3 hours	**To understand the terms and symbols involved in genetics pr0blems.**	Basics of genetics.	• • Presentation • **Solve problems**	**Test studenis to solveDailyand monthly pr0blems**
Second	3 hours	**How to multiply tow individuals with 0pp0site traits.**	**Monohybridization**	• **Show presentation.** • **Solve probleme**	**Daily and monthly Problem solving selection**
Third	3 hours	**How to cross two individuals.one of which has a dominant genotype and the other has a recessive genotype, and vice versa,**	**Reverse hybridization**	• • Presentation • Solve problems	Solv**e daily and monthly proplems**
Fourth	3 hours	**Learn about Mendels hypotheses**	**Mendels hypotheses**	• **Explanation by the subject teacher** • • **Presentation**	**Daily and monthly test**
Fifth	3 hours	**Ldentify the Genotype of an individual carrying a dominant trait of unknown helpe**	**Optional rounding**	• **Presentation** • **Solving of problem**	**Daily and monthly selection in solving problems**
Sixth	3 hours	**How to cross between first generation hybrid individuals with one of the parents or with an individual/ similar to one of them**	**Reactionary taxation**	**Solving problems**	
Seventh	3 hours	**nothing**	First monthly exam	No**thing**	None

Eighth	3 hours	**How to multiply two pairs of opposite adjectives**	**Dihybridization**	• Presentation • **Problem solving**	**Daily tests Monthly tests**
Ninth	3 hours	**To understand the solution of dihybridization problems**	**Completing thedihybridization proplems**	• Presentation • **Problem solving**	**Daily and monthly**
Tenth	3 hours	**How to change the ratios appearance**	**Overlapping genetic action**	• Presentation • **Problem solving**	**Daily tests and monthly tests**
Eleventh	3 hours	**Find out cause of this genetic disease**	**Allele anemia** **Deadly**	• Presentation • **Proplem solving** • Video	**Discussion, dally and discussion Selection**
Twelfth	3 hours	**Find out why these mutations occur**	**Mutations**	• **Solve problems** • Presentation • Video**Presentations**	**Discussion,dally and discussion selection**
Thirteenth	3 hours	**Know the condition in which the two markers are expressed together in the old hybrid mutairi type. And what are factors that determine the blood groups**	**totals** **Sovereignty involved blood**	• **Solve problems** • Presentation • Video**presentations**	**Discussion,dally and discussion selection**

Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5marks for attendance, participation and answering oral questions
5marks for reports and projects
5marks for the first monthly exam
5marks for the second monthly exam
20marks for the final exam
40marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	**Basics of genetics** **Genetics and biotechnology in fish**
Main References (Sources)	**Lectures on genetics**
Recommended Books and References (Scientific Journals, Reports...)	
Electronic References, Websites	**Making presentations**

Theoretical agricultural guidance Course Description

1. Course Name:	
Theoretical agricultural guidance	
2. Course Code:	
AGEX213	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
04/06/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Thamir K. Adday	Email: thamir.adday@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	•Learn about agricultural extension science. •Learn about the objectives of agricultural extension. •Learn about the problems prevalent in Arab rural areas and how agricultural extension contributes to solving them. •Transfer scientific research results to the agricultural community and how to apply them
9. Teaching and Learning Strategies	
Strategy	The course includes (2) theoretical hours - the number of weekly hours is approved and distributed over 15 weeks**.**
10. Course Structure	

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Understanding the role of guidance in improving rural reality	Agricultural extension and its impact on the development of rural communities	Lecture with explanation and presentation	Discussion and oral questions
Second	2 hours	Recognizing mentoring as a tool for development and social change	The role of agricultural extension in development and combating backwardness	Lecture with explanation and presentation	Discussion and oral questions
Third	2 hours	Understanding the theoretical and intellectual foundations of agricultural extension	Agricultural Extension Science, Its Philosophy and Objectives	Lecture with explanation and presentation	Discussion and oral questions
Fourth	2 hours	Knowing the basic principles on which guidance work is based	General principles in agricultural extension	Lecture with explanation and presentation	Discussion and oral questions
Fifth	2 hours	Analysis of the influencing environmental, economic and social factors	Various factors affecting agricultural guidance	Lecture with explanation and presentation	Discussion and oral questions
Sixth	2 hours	Trace the stages of development of agricultural guidance over time	Agricultural extension activity and its development	Lecture with explanation and presentation	Discussion and oral questions
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Distinguish between different types of counseling by style and scope	Types of agricultural guidance	Lecture with explanation and presentation	Discussion and oral questions
Ninth	2 hours	Knowing the professional and personal qualities required of a guide	Characteristics of a successful agricultural guide	Lecture with explanation and presentation	Discussion and oral questions
Tenth	2 hours	. Identify the skills and knowledge needed for success in counseling	Agricultural guide qualifications	Lecture with explanation and presentation	Discussion and oral questions
Eleventh	2 hours	. Familiarity with the duties and role of the guide in the agricultural field	Duties and tasks of the agricultural guide	Lecture with explanation and presentation	Discussion and oral questions

Twelfth	2 hours	Acquire skills in preparing and evaluating guidance programs	Planning guidance programs and evaluating their results	Lecture with explanation and presentation	Discussion and oral questions
Thirteenth	2 hours	Students will be able to learn the basics of monitoring devices and follow up on the specifications of the water used for cultivation.	Instruments and Monitoring	Lecture with explanation and presentation	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	Learn about the organizational structure of guidance and its systems	Agricultural extension systems and regulations	Lecture with explanation and presentation	Discussion and oral questions

11. Course Evaluation

The grade is distributed out of 100 based on the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams, reports, etc.

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Al-Samarrai, Hatem Ali (1975). Agricultural Extension and its Role in Rural Development.
	Mander, Edison Doe. (1983). Translated by Abbas Abdul Mohsen Agricultural Extension / Part 1
Electronic References, Websites	https

Theoretical Course Description

1. Course Name	
Physiology of aquatic biology / theoretical	
Course Code .2	
AQPH315	
3. Semester/Year	
First Semester / 2024-2025	
Date of preparation of this description .4	
02/09/2024	
5. Available attendance forms	
Classroom presence	
6. Number of credit hours (total) / number of units (total)	
Two hours	
7. Course administrator's name (if more than one name is mentioned)	
Name: Prof. Fatima Abdel Hussein Mohamed	Email: fatima.sultan@uobasrah.edu.iq
8. Course Objectives	
• Study the structure and functioning of body systems in fish. • Learn how fish adapt to their different aquatic environments. • Understand feeding methods and their impact on fish growth and health. • Study how factors such as temperature and salinity affect fish physiology. • Learn about methods of managing marine resources and ways to preserve them. • Explore the role of technology in improving fisheries productivity.	Course Objectives

9. Teaching and learning strategies	
• Use interactive techniques such as discussions and questions to stimulate participation. • Encourage students to work in groups on research projects on specific topics. • Organize visits to research centers or aquatic environments to enhance practical understanding. • Conduct practical experiments to better understand physiological processes. • Use online education platforms to provide additional content and educational resources. • Use graphs and mind maps to illustrate complex concepts.	Strategy

10. Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Quiz	Interactive Lecture	Introduction to Aquatic Physiology	Understand the basics of aquatic physiology	2hr	First
Brief Report	Presentation	Anatomy of fish	Recognize the body composition of fish	2hr	Second
Practical assessment	Laboratory experience	Physiology of respiration	Understanding the respiratory systems in fish	2hr	Third
Written test	Lecture and case studies	Circulatory physiology	Circulatory systems analysis	2hr	Fourth
Research Project	Group Discussion	Physiology of nutrition	Understanding the nutrition systems in fish	2hr	V
Field Report	Field study	The influence of the environment	Study of the impact of environmental factors	2hr	Sixth
Quiz	Video tutorial and discussion	Physiology of reproduction	Knowledge of breeding strategies	2hr	Seventh
Practical assessment	Interactive Lecture	Fish behavior	Understand fish behaviour and marine resource management	2hr	Eighth
Analysis Report	Case Study	Environmental impacts	Contaminant Impact Analysis	2hr	Ninth

Written test	Workshop	Physiological adaptations	Understand environmental adaptation	**2hr**	**X**
Research Project	Lecture and case studies	Production and breeding systems	Assessment of fish production systems	**2hr**	**Eleventh**
Practical assessment	Presentation	Technology in aquaculture	Understand the role of technology in marine wealth	**2hr**	**Twelfth**
Field Report	Field study	Scientific Research Methodology	Data Analysis in Research	**2hr**	**Thirteenth**
Evaluation of a report	Workshop	Scientific Report Writing	Develop research and analysis skills	**2hr**	**Fourteenth**
Final Exam	Open discussion session	General Review	Comprehensive review of the material	**2hr**	**Fifteenth**

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, oral, monthly, written exams, reports ... Etc.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 degrees
40 degrees for the practical part

12. Learning and Teaching Resources

No textbook	Required textbooks (methodology, if any)
- Introduction to Fish Physiology 1,2,3,.....	Key references (sources)

- Various research and theses on physiology	Recommended supporting books and references (scientific journals, reports...)
Many sites on the Internet, including the Great Fish Encyclopedia	Electronic references, websites

Practical Course Description

1. Course Name
Physiology / Lab
Course Code .2
AQPH315
3. Semester/Year
First Semester / 2024-2025
Date of preparation of this description .4
02/09/2024
5. Available attendance forms
Presence in the laboratory
6. Number of credit hours (total) / number of units (total)
3 hours
7. Course administrator name (if more than one name)
Name: Prof. Fatima Abdel Hussein Mohamed Email: fatima.sultan@uobasrah.edu.iq
8. Course Objectives

• Enable students to conduct scientific experiments independently. • Promote a practical understanding of physiological concepts related to aquatic biology. • Teach students how to collect and analyze data from experiments. • Linking theoretical information with practical applications in a laboratory environment. • Encourage students to conduct independent research and develop scientific writing skills. • Understand how environmental factors affect fish physiology and behavior. • Enhance collaboration and teamwork skills while conducting experiments. • Learn about the latest techniques used in the study of aquatic biology. • Understand the importance of following	Course Objectives

9. Teaching and learning strategies	
• Encourage students to work in groups on practical research projects that enhance their understanding of physiological concepts. • Organize interactive hands-on experiences that allow students to explore and interact with concepts directly. • Provide direct supervision and guidance during experiments, helping students understand the correct procedures and the importance of accuracy. • Encourage teamwork among students to stimulate the exchange of knowledge and experiences, thereby enhancing the process of group learning. • Integrate technological tools such as software simulations or educational applications to enhance practical understanding and	Strategy

10. Course Structure

Evaluation method	**Learning method**	**Unit or subject name**	**Required Learning**	**Hours**	**Week**
Oral assessment	Lecture and presentation	Introduction to Aquatic Physiology	Understand the basic principles of aquatic physiology	**3hours**	**First**
Brief Report	Anatomical experiment	Anatomy of fish	Ability to perform fish dissection	**3hours**	**Second**

Practical assessment	Laboratory experience	Physiology of respiration	Measuring the percentage of oxygen in water	**3hours**	**Third**
Practical test	Case Study	Circulatory physiology	Understanding the mechanism of blood circulation in	**3hours**	**Fourth**
Practical assessment	Nutritional experience	Physiology of nutrition	Assessment of feeding systems in fish	**3hours**	**V**
Field Report	Field study	The influence of the environment on fish physiology	Analysis of the impact of environmental factors on fish	**3hours**	**Sixth**
Research Project	Field study	Physiology of reproduction	Understanding breeding methods in fish	**3hours**	**Seventh**
Practical assessment	Observation experience	Fish behavior	Monitor fish behaviors in different environments	**3hours**	**Eighth**
Analysis Report	Field experience	Environmental impacts	Analysis of the impact of pollutants on aquatic organisms	**3hours**	**Ninth**
Practical assessment	Workshop	Physiological adaptations	Understand the physiological adaptations of fish	**3hours**	**X**
Field Report	Visit to a fish farm	Production and breeding systems	Assessment of fish production systems	**3hours**	**Eleventh**
Practical assessment	Experiment with applying new	Technology in aquaculture	Application of technology in aquatics	**3hours**	**Twelfth**

Evaluation of a report	Workshop	Scientific Research Methodology	Improving scientific research skills	**3hours**	**Thirteenth**
Evaluation Reports	Workshop	Scientific Report Writing	Writing accurate scientific	**3hours**	**Fourteenth**
Final Practical Test	Open discussion session	General Review	Comprehensive review of the material	**3hours**	**Fifteenth**

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, oral, monthly, written exams, reports ... Etc.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
Total 40 degrees
60 degrees for the theoretical part

12. Learning and Teaching Resources

No textbook	Required textbooks (methodology, if any)
	Key references (sources)
- Various research and theses on physiology	Recommended supporting books and references (scientific journals, reports...)
Many sites on the Internet, including the Great Fish Encyclopedia	Electronic references, websites

Theoretical Course Description

1. Course Name:	
Invertebatrates / Theoretical	
2. Course Code:	
sss	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Assist. Prof. Thamir K. Adday	Email: thamiradday@gmail.com
8. Course Objectives	
Course Objectives	• Teach students about different groups of invertebrates • Teach students about invertebrates found in the marine environment. • Teach students about invertebrates found in the freshwater environment. • Display different models of invertebrates. • Introduce students to ready-made glass slides of invertebrates. • Identify diagnostic characteristics of different groups of invertebrates..
9. Teaching and Learning Strategies	

Strategy	• Practical lectures in the laboratory and field visits. • Presentations and video materials. • Group discussions. • Learning based on displaying different models of invertebrates and marking the parts. • Learning based on displaying glass slides of invertebrate **models**

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Students will be able to identify the general characteristics of different invertebrate groups.	General introduction and review of examples of different invertebrate groups in different environments.	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Students can learn about protists, some free-living species, and some parasitic species.	The Protozoa	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used production units
Third	2 hours	Students can identify cnidarians and their presence in the aquatic environment.	Cnidaria (Coelentrata)	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Students will be able to identify natural and artificial porous (spongy) groups.	Porirea (Sponges)	• Theoretical lecture • Presentation • Group discussion Video presentations	Earth pond design project
Fifth	2 hours	Students can learn about flat diatoms, their different types, and their occurrence.	Platyhelminthe (Turbellaria & Trematoda)	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Sixth	2 hours	Introducing the student to different groups of tapeworms and their different types and their presence.	Platyhelminthes (Cestoda)	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Seventh	2 hours	None	Monthly Exam	None	None
Eighth	2 hours	Introduce students to the different groups of nematodes, and identify some of their free and parasitic groups.	The Nematoda	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Providing information to students about annelids and their presence.	The Annelida	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	General information for students about the jointed legs and their different groups	The Arthropoda/ Part 1	• Theoretical lecture • Presentation • Group discussion Video	Comparative report between closed culture systems, aquaponics and biofloc
Eleventh	2 hours	Introducing students to arthropods and identifying harmful and beneficial species.	The Arthropoda/ Part 2	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Statement of the different soft groups, identification of the types, and identification of some economically influential types.	The Mollusca	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Highlighting the different groups of echinoderms and their relationship to the aquatic environment.	The Echinodermata	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	The Invertebrates: An Introduction to the Invertebrates
Recommended Books and References (Scientific Journals, Reports...)	Marine Invertebrates: Communities at Risk
Electronic References, Websites	https://guides.lib.ua.edu/invertebrate_zoology

Practical Course Description

1. Course Name:	
The Invertebrates / Practical	
2. Course Code:	
ee	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Thamir K. Adday	Email:
8. Course Objectives	
Course Objectives	• Teach students about different groups of invertebrates • Teach students about invertebrates found in the marine environment. • Teach students about invertebrates found in the freshwater environment. • Display different models of invertebrates. • Introduce students to ready-made glass slides of invertebrates. • Identify diagnostic characteristics of different groups of invertebrates.
9. Teaching and Learning Strategies	

Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to identify the general characteristics of different invertebrate groups.	General introduction and review of examples of different invertebrate groups in different environments.	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	3 hours	Introducing students to different groups of Protozoans animals and explaining their benefits and harms	The protozoa including; *Entamoeba*, *Ceratium, Ephelota*, *Stentor*	•Practical lecture •Presentation of models and slides •Group discussion	Quick test, Students identify, draw and describe species.
Third	3 hours	Introducing students to different groups of stinging animals, their benefits and harms.	The Cnidaria including *Hydra*, *Aurelia*, *Metridium***.**	• Practical lecture • Presentation • Group discussion	Quick test, Students identify, draw and describe species.
Fourth	3 hours	Introducing students to sponges and explaining the commercial types of them.	Sponges (porous) include *Leucosolenia*, *Grantia*, *Euspongia*, *Spongilla* and the different patterns and systems in the construction of the sponge structure.	• Practical lecture • Presentation • Group discussion	Quick test: Students identify, draw and describe species.
Fifth	3 hours	Introduce students to flatworms, which includes turbellaria and trematodes.	The Platyhelminthes including *Planaria*, *Dicrocoleium*, *Clonorchis*, *Fasciola***.**	Practical lecture Viewing models Glass	Drawing models, marking parts and identifying different taxonomic
Sixth	3 hours	Show examples of different tapeworms and learn about their general characteristics and harms.	Tapeworms include comparison of pork tapeworm and beef tapeworm *Taenia solium*, *T. saginata*, *Echinococcus*	• Practical lecture • Presentation Group discussion	Drawing models, marking parts and identifying different
Seventh	3 hours	None	First monthly exam	None	None

Eighth	3 hours	Show examples of different nematodes and learn about their general characteristics and harms**.**	Nematodes include *Ascaris*, *Ancylostoma*, *Trichinella*.	• Practical lecture • Group discussion • Presentation	Drawing models, marking parts and identifying different
Ninth	3 hours	Showing examples of different annelids and learning about their general characteristics, harms, and the different environments in which they are found.	Annelids include the identification of different genera of annelids: *Lumbricus*, *Neries*, *Hirudo*.	•Practical lecture • Displaying models	Drawing models, marking parts and identifying different
Tenth	3 hours	Displaying models of animals in the different phylum Arthropoda and learning about their general characteristics, their harms, and the different environments in which they are found.	Arthropoda Order: Cladocera *Daphnia* Water flea And subclass: Copepoda *Cyclops* Subclass: Branchiura Fish lice *Argulus*	•Practical lecture • Displaying models	Drawing models, marking parts and identifying different
Eleventh	3 hours	Displaying models of animals in the different phylum Arthropoda and learning about their general characteristics, their harms, and the different environments in which they are found.	Arthropoda Subclass: Cirripedia *Lepas*, itc Amphibalanus Class: Chilopoda *Scolopendra*, itc	Practical lecture Displaying models	Drawing models, marking parts and identifying different
Twelfth	3 hours	Introducing students to different types of soft things that exist in our environment.	*The molluscans including: Acanthochiton*, *Chiton*, *Sepia*, *Octopus*	Practical lecture Displaying models	Drawing models, marking parts and identifying different
Thirteenth	3 hours	Students will be able to identify the basics of monitoring equipment and follow up on the specifications of the water used for cultivation.	Echinoderms include starfish, brittle star, sea cucumber, sea urchin, and sea lily *Asteropecton*, *Ophiocoma*, *Echinus*, *Holothuria*, *Antedon*	Practical lecture Displaying models	Drawing models, marking parts and identifying different
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Lal, S. S. (2010). Practical zoology Ivertebrate : 512 pp.
Recommended Books and References (Scientific Journals, Reports...)	Storer; T. I. and Usinger, R.L. and Stebbins(2000) General Zoology
Electronic References, Websites	https://guides.lib.ua.edu/invertebrate_zoology

Theoretical Course Description

1. Course Name:	
Marshes and wetlands environments/ Theoretical	
2. Course Code:	
MWEN317	
3. Semester / Year:	
First Semester / 2024-2025	
4. Description Preparation Date:	
25/ 02/ 2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Naeem S. Hammadi	Email: naeem.hammadi@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Graduate students who are able to: • Understand the importance of marshes and wetlands as unique ecological habitats. • Identify the physical, chemical, and biological characteristics of these ecosystems. • Study the biodiversity of marshes and wetlands and the special adaptations of organisms. • Evaluate the challenges and threats facing marshes and wetlands (pollution, drought, climate change). • Identify methods for sustainable management and conservation of these environments. • Gain practical skills in surveying, assessing, and monitoring marsh and wetland environments.
9. Teaching and Learning Strategies	
Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Students will be able to identify general basic information about the environment of marshes and wetlands.	Introduction to marshes and wetlands: definition, main types (bogs, sabkhas, peatlands, etc.), global and local geographical distribution (with emphasis on the marshes of Iraq).	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Students will be able to understand the physical characteristics of marshes and wetlands.	Physical characteristics of wetlands: hydrology (water sources, flow patterns, flooding periods), soils (soil types, physical and chemical properties of waterlogged soils).	• Theoretical lecture • Presentation • discussion	he exams Daily and monthly And final reports Daily
Third	2 hours	Students will be able to understand the physical characteristics of marshes and wetlands.	Physical characteristics of wetlands: hydrology (water sources, flow patterns, flooding periods), soils (soil types, physical and chemical properties of waterlogged soils).	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Students will be able to understand the biodiversity of plants in marshes and wetlands. Wetland	biodiversity: aquatic and submergence-tolerant plants (physiological and morphological adaptations).	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Fifth	2 hours	Students will be able to understand the biodiversity strategies in marshes, swamps and wetlands.	Wetland biodiversity: invertebrates (aquatic insects, crustaceans, molluscs) and vertebrates (fish, amphibians, reptiles).	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Sixth	2 hours	Students will be able to understand wetland biodiversity: waterfowl and mammals.	Wetland biodiversity: waterfowl and mammals associated with wetlands.	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Students will be able to understand ecological interactions in wetlands: food chains and webs, relationships between organisms (commensalism, predation, parasitism).	Ecological interactions in wetlands: food chains and webs, relationships between organisms (commensalism, predation, parasitism).	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Ninth	2 hours	Students will be able to identify the functions and services of wetland ecosystems.	The functions and services of wetland ecosystems include: water purification, flood control, groundwater recharge, shoreline stabilization, and carbon sequestration.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Tenth	2 hours	Students will be able to identify the importance of threats to wetlands.	Threats to wetlands include: pollution (industrial, agricultural, domestic), water depletion (dams, diversions), drainage, and landfilling.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Eleventh	2 hours	Students will be able to identify threats such as invasive species, overfishing, and climate change and its impacts.	Threats facing wetlands: invasive species, overfishing, and climate change and its impacts (sea level rise, changing precipitation patterns).	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Students will be able to learn about wetland conservation.	Wetland conservation: international agreements (such as the Ramsar Convention), local laws and regulations, and the establishment of nature reserves.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Students will be able to understand the restoration of degraded wetlands: principles and techniques of ecological restoration.	Restoration of degraded wetlands: principles and techniques of ecological restoration.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None

Main References (Sources)	- "Wetland Ecology: Principles and Conservation" by Paul A. Keddy. - "Wetlands" by William J. Mitsch and James G. Gosselink. - "The Ecology of Peatlands and Bogs" by Graeme T. Wannop. - "An Introduction to Wetland Ecology" by Ralph W. Tiner Jr. The Ramsar Convention on Wetlands.
Recommended Books and References (Scientific Journals, Reports...)	- Publications of the Ramsar Convention on Wetlands - Publications of the International Union for Conservation of Nature (IUCN) - Publications of Wetlands International - Publications of the United Nations Environment Programme (UNEP) and other UN organizations - Reports of UN programs and international organizations operating in Iraq - Academic research published in scientific journals
Electronic References, Websites	https://www.fisheries.noaa.gov/national/habitat-conservation/coastal-wetland-habitat https://www.wetlands.org/ https://education.nationalgeographic.org/resource/wetland/

Practical Course Description

1. Course Name:
Marshes and wetlands environments/ Practical
2. Course Code:
MWEN317
3. Semester / Year:
First Semester / 2024-2025
4. Description Preparation Date:
25/ 02/ 2025
5. Available Attendance Forms:
Attendance in the laboratory and field visits
6. Number of Credit Hours (Total) / Number of Units (Total)

3 hours per week / 1.5 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Dr. Naeem S. Hammadi Email: naeem.hammadi@uobasrah.edu.iq
8. Course Objectives

Course Objectives	• Graduate students who are able to: • Understand the importance of marshes and wetlands as unique ecological habitats. • Identify the physical, chemical, and biological characteristics of these ecosystems. • Study the biodiversity of marshes and wetlands and the special adaptations of organisms. • Evaluate the challenges and threats facing marshes and wetlands (pollution, drought, climate change). • Identify methods for sustainable management and conservation of these environments. • Gain practical skills in surveying, assessing, and monitoring marsh and wetland environments.
9. Teaching and Learning Strategies	
Strategy	• Practical lectures in the laboratory and field visits. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.
10. Course Structure	

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	**Students will be able to identify the basic aspects of marsh and wetland ecology.**	**A general discussion about the importance of marsh and wetlands to human life and the environment. View maps and images of different types of wetlands around the world.**	• Theoretical lecture • Presentation • discussion	the exams Daily and monthly And final reports Daily
Second	3 hours	**Students will be able to study hydrological maps of a local marsh or wetland.**	**Study hydrological maps of a local marsh or wetland. Analyze soil samples or watch videos demonstrating wetland soil characteristics.**	• Theoretical lecture • Presentation • discussion	the exams Daily and monthly And final reports Daily

Third	3 hours	**Students will be able to simulate measuring some chemical properties of water (using simple test kits or historical data).**	**Simulate measuring some chemical properties of water (using simple test kits or historical data).**	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Fourth	3 hours	**Students will be able to identify major wetland plant species.**	**Identify major wetland plant species (using photographs, dried specimens, or a field visit, if possible).**	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Fifth	3 hours	**Students will be able to study models or pictures of different types of animals that live in wetlands.**	**Study models or pictures of different types of animals that live in wetlands. Watch documentaries about wildlife in marshes and wetlands.**	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Sixth	3 hours	**Students will be able to identify common bird and mammal species in local wetlands.**	**Identify common bird and mammal species in local or regional wetlands (using field guides, photographs, and audio recordings).**	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Seventh	3 hours	None	First Monthly Exam	None	None
Eighth	3 hours	**Students will be able to understand a simplified food web for a marsh or wetland ecosystem.**	**Draw a simplified food web for a marsh or wetland ecosystem.**	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Ninth	3 hours	**Students will be able to conduct a case study that illustrates one of the functions of wetlands.**	**A case study that illustrates one of the important functions of wetlands (e.g., the role of wetlands in mitigating the effects of flooding).**	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Tenth	3 hours	**Students will be able to analyze data or reports on the major sources of pollution affecting wetlands.**	**Analyze data or reports on the major sources of pollution affecting wetlands.**	• Theoretical lecture • Presentation • Group discussion • Video	he exams Daily and monthly And final reports Daily
Eleventh	3 hours	**Students will be able to understand the impact of a particular invasive**	**Discuss the impact of a particular invasive species on a local marsh ecosystem (if present) or globally.**	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily

Twelfth	3 hours	**Students will be able to identify the Ramsar Convention and its importance. Research Ramsar sites in the region**	**Learn about the Ramsar Convention and its importance. Research Ramsar sites in the region or country.**	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Thirteenth	3 hours	**Students will be able to conduct a case study of a wetland restoration project (e.g., the Iraqi Marshlands Restoration Project).**	**Watch videos or a case study of a wetland restoration project (e.g., the Iraqi Marshlands Restoration Project).**	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	- "Wetland Ecology: Principles and Conservation" by Paul A. Keddy. - "Wetlands" by William J. Mitsch and James G. Gosselink. - "The Ecology of Peatlands and Bogs" by Graeme T. Wannop. - "An Introduction to Wetland Ecology" by Ralph W. Tiner Jr. The Ramsar Convention on Wetlands.
Recommended Books and References (Scientific Journals,	- Publications of the Ramsar Convention on Wetlands - Publications of the International Union for Conservation

Electronic References, Websites	https://www.fisheries.noaa.gov/national/habitat-conservation/coastal-wetland-habitat https://www.wetlands.org/ https://education.nationalgeographic.org/resource/wetland/

Theoretical Course Description

1. Course Name:	
Design and Analysis of Agricultural Experiments / Theoretical	
2. Course Code:	
DAEX327	
3. Semester / Year:	
First Semester / 2024-2025	
4. Description Preparation Date:	
02/09/2024	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Two hours per week (30 hours per semester) / 2 units (2 units)	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Riyadh Adnan Irmayla	Email: riyadh.irmayla@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• The student understands the basic principles of agricultural experimental design. • Distinguishes between different types of experimental designs. • Conducts statistical analysis of experimental results. • Interprets statistical results and draws scientific recommendations. • Designs a comprehensive agricultural experiment according to specific research objectives. • Develops critical thinking skills in agricultural experiments. • Ability to apply scientific methods to solve agricultural problems.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Learning based on homework, reports and projects.

10. Course Structure

Week	Hours	Required learning outcomes	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the concept of designing and analyzing agricultural experiments and its importance in agricultural scientific research. ✓ Clarify the role of agricultural experiments in improving agricultural production and making scientific decisions. ✓ Identify the basic components of an agricultural experiment (such as factors, treatments, experimental units, replicates, etc.). ✓ List the types of experimental designs used in agricultural research in general. ✓ Link statistical analysis and experimental design to achieve accurate and reliable results. ✓ Evaluate the importance of proper experimental planning to ensure the reliability and applicability of results.	**Introduction, General Concepts**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Second	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of analysis of variance (ANOVA) and its importance in analyzing agricultural experiments. ✓ Defines the null and alternative hypotheses. ✓ Apply the steps of ANOVA to simple experimental data. ✓ Interprets the outputs of ANOVA and hypothesis testing to understand the significance of differences between treatments. ✓ Defines the conditions for using ANOVA and understands its assumptions (such as homogeneity and normal distribution). ✓ Distinguishes between types of statistical errors (Type I and Type II) when testing hypotheses. ✓ Draws scientific conclusions based on the	**Analysis of Variance and Hypothesis Testing**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Third	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of a completely randomized design and its uses in agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Determines when a completely randomized design is appropriate based on the nature of the experiment. ✓ Designs an experiment using a completely randomized design, specifying the number of treatments and replications. ✓ Tabulates data from an experiment designed according to this type of design. ✓ Apply analysis of variance (ANOVA) to data from a completely randomized design. ✓ Interprets the results of statistical analysis and infers	**Completely Randomized Design**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Fourth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of multiple comparison tests (or post-hoc) and their importance after analysis of variance. ✓ Distinguishes between types of independent comparisons, such as the least significant difference (LSD) test, normal and revised, Duncan's test, and Dunnett's test. ✓ Determines when to use independent comparisons in analyzing the results of agricultural experiments. ✓ Selects the most appropriate statistical test based on the number of parameters and the nature of the data. ✓ Implements the steps for conducting independent comparisons after demonstrating significant differences through ANOVA. ✓ Uses the letter method to present the results of independent comparisons. ✓ Interprets the results of comparisons to determine the true differences between means.	**Independent Comparisons 1**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test
Fifth	2 hours	**None**	**First Monthly Exam**	None	None
Sixth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of multiple comparison tests (or post-hoc) and their importance after analysis of variance. ✓ Distinguishes between types of independent comparisons, such as the least significant difference (LSD) test, normal and revised, Duncan's test, and Dunnett's test. ✓ Determines when to use independent comparisons in analyzing the results of agricultural experiments. ✓ Selects the most appropriate statistical test based on the number of parameters and the nature of the data. ✓ Implements the steps for conducting independent comparisons after demonstrating significant differences through ANOVA. ✓ Uses the letter method to present the results of independent comparisons. ✓ Interprets the results of comparisons to determine the true differences between means.	**Independent Comparisons 2**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Seventh	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of a randomized complete block design (RCBD) and the reasons for its use in agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the mathematical model equation for the design. ✓ Explains the difference between a randomized complete block design and a completely randomized design in terms of structure and use. ✓ Defines design components such as blocks, treatments, and replication. ✓ Designs an agricultural experiment using RCBD with treatments randomly distributed within blocks. ✓ Organizes data from an experiment designed with this design. ✓ Apply an analysis of variance appropriate for this type of design for a randomized complete block design. ✓ Interprets the results of statistical analysis to determine the effect of treatments and significant differences. ✓ Evaluates the homogeneity of blocks and its impact on the accuracy and results of the	**Randomized Complete Block Design**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Eighth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of missing values in agricultural experimental data and the reasons for their occurrence. ✓ Apply methods for estimating missing values appropriate to block design. ✓ Understands the concept of relative efficiency of experimental designs and explains its importance in comparing different designs. ✓ Calculates the relative efficiency of block	**Missing Values** **Relative Efficiency**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Ninth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of the Latin square design and the reasons for its use in agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Identifies situations in which this design is appropriate, especially when two sources of variance (rows and columns) are involved. ✓ Explains the components of the Latin square design (number of treatments, rows, columns). ✓ Designs an experiment using the Latin square, distributing treatments in an organized manner that ensures no	**Latin Square Design**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test
Tenth	2 hours	**None**	**Second Monthly Exam**	None	None
Eleventh	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of missing values in agricultural experimental data and the reasons for their occurrence. ✓ Apply methods for estimating missing values appropriate to the Latin square design. ✓ Understands the concept of relative efficiency of experimental designs and explains its importance in comparing different designs. ✓ Calculates the relative efficiency of a Latin square design	**Missing Values** **Relative Efficiency**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Twelfth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of factorial experiments and their importance in agricultural research. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Distinguishes between different factorial designs (such as 2×2, 3×2, etc.) and the number of factorial parameters resulting from them. ✓ Determines the differences between main effects and interactions between factors. ✓ Designs a factorial experiment involving two or more factors, accurately determining the levels of each factor.	**Factorial Experiments 1**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Thirteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of factorial experiments and their importance in agricultural research. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Distinguishes between different factorial designs (such as 2×2, 3×2, etc.) and the number of factorial parameters resulting from them. ✓ Determines the differences between main effects and interactions between factors. ✓ Designs a factorial experiment involving two or more factors, accurately determining the levels of each factor. ✓ Organizes data from the experiment in a	**Factorial Experiments 2**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Fourteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of a split-plot design and the reasons for its use in complex agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Distinguishes between primary and secondary plots in a design. ✓ Identifies situations where a split-plot design is more appropriate than other designs. ✓ Designs an experiment using split plots, specifying the factors distributed among the primary and secondary plots. ✓ Tabulates data from an experiment using a split-plot design in a precise	**Split-Plot Design**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Fifteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the concept of artificial intelligence and its role in developing biostatistical applications. ✓ Distinguish between traditional and AI-assisted methods in data analysis. ✓ Identify common AI applications in statistical fields. ✓ Evaluate the importance of AI in improving the quality of prediction and decision-making.	**Artificial Intelligence AI General Review**	✓ Solve various example ✓ Group discussion ✓ Answering students' questions	None

11. Course Evaluation

Distribution of the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly written exams, reports, etc.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Al-Rawi, K.M. (1989). Introduction to Statistics, 469 pp.

Main References (Sources)	
Recommended Books and References (Scientific Journals, Reports...)	
Electronic References, Websites	

Practical Course Description

The practical part is a practical application of the theoretical part through examples about statistical applications for agricultural experiments.

1. Course Name:
Design and Analysis of Agricultural Experiments / Practical
2. Course Code:
DAEX327
3. Semester / Year:
First Semester / 2024-2025
4. Description Preparation Date:
02/09/2024
5. Available Attendance Forms:
Attendance in the laboratory
6. Number of Credit Hours (Total) / Number of Units (Total)
Three hours per week (45 hours per semester) / One and a half units (one and a half units)

7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Entisar S. Hashim	Email: intisar.hussain@uobasrah.edu.iq

8. Course Objectives	
Course Objectives	● The student understands the basic principles of agricultural experimental design. ● Distinguishes between different types of experimental designs. ● Conducts statistical analysis of experimental results. ● Interprets statistical results and draws scientific recommendations. ● Designs a comprehensive agricultural experiment according to specific research objectives. ● Develops critical thinking skills in agricultural experiments. ● Ability to apply scientific methods to solve agricultural problems.

9. Teaching and Learning Strategies	
Strategy	● Theoretical lectures in classrooms. ● Presentations and video materials. ● Group discussions. ● Problem-based learning, inquiry and brainstorming. ● Learning based on homework, reports and projects.

10. Course Structure

Week	Hours	Required learning outcomes	Unit or Subject Name	Learning Method	Evaluation Method

First	3 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the concept of designing and analyzing agricultural experiments and its importance in agricultural scientific research. ✓ Clarify the role of agricultural experiments in improving agricultural production and making scientific decisions. ✓ Identify the basic components of an agricultural experiment (such as factors, treatments, experimental units, replicates, etc.). ✓ List the types of experimental designs used in agricultural research in general. ✓ Link statistical analysis and experimental design to achieve accurate and reliable results. ✓ Evaluate the importance of proper experimental planning to ensure the reliability and applicability of results.	**Introduction, General Concepts**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Second	3 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the concept of analysis of variance (ANOVA) and its importance in analyzing agricultural experiments. ✓ Defines the null and alternative hypotheses. ✓ Apply the steps of ANOVA to simple experimental data. ✓ Interprets the outputs of ANOVA and hypothesis testing to understand the significance of differences between treatments. ✓ Defines the conditions for using ANOVA and understands its assumptions (such as homogeneity and normal distribution). ✓ Distinguishes between types of statistical errors (Type I and Type II) when testing hypotheses. ✓ Draws scientific conclusions based on the results of ANOVA.	**Analysis of Variance and Hypothesis Testing**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Third	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of a completely randomized design and its uses in agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Determines when a completely randomized design is appropriate based on the nature of the experiment. ✓ Designs an experiment using a completely randomized design, specifying the number of treatments and replications. ✓ Tabulates data from an experiment designed according to this type of design. ✓ Apply analysis of variance (ANOVA) to data from a completely randomized design. ✓ Interprets the results of statistical analysis and infers the significance of differences between treatments.	**Completely Randomized Design**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Fourth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of multiple comparison tests (or post-hoc) and their importance after analysis of variance. ✓ Distinguishes between types of independent comparisons, such as the least significant difference (LSD) test, normal and revised, Duncan's test, and Dunnett's test. ✓ Determines when to use independent comparisons in analyzing the results of agricultural experiments. ✓ Selects the most appropriate statistical test based on the number of parameters and the nature of the data. ✓ Implements the steps for conducting independent comparisons after demonstrating significant differences through ANOVA. ✓ Uses the letter method to present the results of independent comparisons. ✓ Interprets the results of comparisons to determine the true differences between	**Independent Comparisons 1**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test

Fifth	3 hours	**None**	**First Monthly Exam**	None	None
Sixth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of multiple comparison tests (or post-hoc) and their importance after analysis of variance. ✓ Distinguishes between types of independent comparisons, such as the least significant difference (LSD) test, normal and revised, Duncan's test, and Dunnett's test. ✓ Determines when to use independent comparisons in analyzing the results of agricultural experiments. ✓ Selects the most appropriate statistical test based on the number of parameters and the nature of	**Independent Comparisons 2**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Seventh	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of a randomized complete block design (RCBD) and the reasons for its use in agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the mathematical model equation for the design. ✓ Explains the difference between a randomized complete block design and a completely randomized design in terms of structure and use. ✓ Defines design components such as blocks, treatments, and replication. ✓ Designs an agricultural experiment using RCBD with treatments randomly distributed within blocks. ✓ Organizes data from an experiment designed with this design. ✓ Apply an analysis of variance appropriate for this type of design for a randomized complete block design. ✓ Interprets the results of statistical analysis to determine the effect of treatments and significant differences. ✓ Evaluates the homogeneity of blocks and its impact on the accuracy and results of the	**Randomized Complete Block Design**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Eighth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of missing values in agricultural experimental data and the reasons for their occurrence. ✓ Apply methods for estimating missing values appropriate to block design. ✓ Understands the concept of relative efficiency of experimental designs and explains its importance in comparing different designs. ✓ Calculates the	**Missing Values** **Relative Efficiency**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Ninth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of the Latin square design and the reasons for its use in agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Identifies situations in which this design is appropriate, especially when two sources of variance (rows and columns) are involved. ✓ Explains the components of the Latin square design (number of treatments, rows, columns). ✓ Designs an experiment using the Latin square, distributing treatments in an organized manner that ensures no duplication in rows or columns. ✓ Correctly tabulates	**Latin Square Design**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test
Tenth	3 hours	**None**	**Second Monthly Exam**	None	None

Eleventh	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of missing values in agricultural experimental data and the reasons for their occurrence. ✓ Apply methods for estimating missing values appropriate to the Latin square design. ✓ Understands the concept of relative efficiency of experimental designs and explains its importance in comparing different designs. ✓ Calculates the relative efficiency	**Missing Values** **Relative Efficiency**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Twelfth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of factorial experiments and their importance in agricultural research. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Distinguishes between different factorial designs (such as 2×2, 3×2, etc.) and the number of factorial parameters resulting from them. ✓ Determines the differences between main effects and interactions between factors. ✓ Designs a factorial experiment involving two or more factors, accurately determining the levels of each factor. ✓ Organizes data from	**Factorial Experiments 1**	✓ Practical lecture ✓ Presentation ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Thirteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of factorial experiments and their importance in agricultural research. ✓ Explains the advantages and disadvantages of the design. ✓ Formulates the equation for the mathematical model of the design. ✓ Distinguishes between different factorial designs (such as 2×2, 3×2, etc.) and the number of factorial parameters resulting from them. ✓ Determines the differences between main effects and interactions between factors. ✓ Designs a factorial experiment involving two or more factors, accurately determining the levels of each factor. ✓ Organizes data from	**Factorial Experiments 2**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework

Fourteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Performs calculations as well as ✓ Explains the concept of a split-plot design and the reasons for its use in complex agricultural experiments. ✓ Explains the advantages and disadvantages of the design. ✓ Distinguishes between primary and secondary plots in a design. ✓ Identifies situations where a split-plot design is more appropriate than other designs. ✓ Designs an experiment using split plots, specifying the factors distributed among the primary and secondary plots. ✓ Tabulates data from an experiment using a split-plot design in a precise and organized manner. ✓ Conducts an analysis of variance	**Split-Plot Design**	✓ Theoretical lecture ✓ Presentation ✓ Group discussion ✓ Examples and solutions ✓ Interpretation of results	✓ Participate in solving examples ✓ Quick test ✓ Homework
Fifteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the concept of artificial intelligence and its role in developing biostatistical applications. ✓ Distinguish between traditional and AI-assisted methods in data analysis. ✓ Identify common AI applications in statistical fields. ✓ Evaluate the importance of AI in improving the quality of prediction and decision-making.	**Artificial Intelligence AI General Review**	✓ Solve various example ✓ Group discussion ✓ Answering students' questions	None

11. Course Evaluation

Distribution of the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly written exams, reports, etc.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	Al-Rawi, K.M. (1989). Introduction to Statistics, 469 pp.
Main References (Sources)	
Recommended Books and References (Scientific Journals, Reports...)	
Electronic References, Websites	

Theoretical Course Description

1. Course Name:	
Fish Diet Technology / Theoretical	
2. Course Code:	
FDTC316	
3. Semester / Year:	
First Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Salah M. Najim	Email: salah.mahdi@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Teaching students the importance of nutrition and feed components. • Teaching students modern methods of manufacturing fish feed. • Teaching students different means of evaluating fish feed. • Teaching students the basic concepts of manufacturing fish feed and its relationship to fish nutrition. • Teaching students to deal with modern feeding methods and techniques. • Teaching students the nature and types of basic materials and equipment used in manufacturing fish feed.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Introduction and historical presentation of the development of feed manufacturing.	The basics of fish feed manufacturing	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Explanation and clarification of the importance of chemical composition and components of food.	Chemical composition and food ingredients	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used production units
Third	2 hours	Food classification: energy sources- protein sources other sources.	Food classification	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Explanation and clarification of the food ingredient used in feeding fish, their importance and their use.	Food ingredients used in feeding fish	• Theoretical lecture • Presentation • Group discussion Video	Earth pond design project
Fifth	2 hours	Explain and clarify the different types of diets and their specifications.	Types of diets	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Sixth	2 hours	Explanation and clarification of the most important methods to diet formulation and how to calculate it.	Methods of diet formulation	• Theoretical lecture • Presentation • Group discussion Video	Cage design project
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Explanation of the General characteristics of Devices for drying Mixing, grinding Cooling and packing.	Machines and equipment used For the manufacture of diets	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Familiarize students to the steps of diet manufacturing: mixing, Grinding and pelleting.	Diets manufacturing methods	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	Familiarize students with the Methods of storing and handling the diets, the conditions and specifications for storing the diets.	Diets storage methods	• Theoretical lecture • Presentation • Group discussion Video	Comparative report between closed culture systems, aquaponics and biofloc
Eleventh	2 hours	A detailed explanation of the problems of using diets in fish feeding and their solution.	Problems of using diets in fish feeding	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Explanation and clarification of methods for evaluating diets chemically, physically and biologically.	Diets evaluation	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Explain and clarify the analysis of the chemical component of diets.	Methods for analyzing the components of diets	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	1-Food and Feeding of Fish. Ahmad, T.A & Salman, N.A., 1982. 2- Fish Culture. N.K. Al-Daham, 1990
Main References (Sources)	1-Fish Nutrition. Halver &Hardy (2002) 2- Feed Management in Intensive Aquaculture. Goddard, (1996) 3- Aquafeed formulation. Sergio (2016)

Recommended Books and References (Scientific Journals, Reports...)	HANDBOOK ON INGREDIENTS FOR AQUACULTURE FEEDS. Hertrampf & Piedad-Pascual (2000) FISH FEED FORMULATION METHOD. kumar (2020) Feed and Feeding Practices in Aquaculture. Davis (2015) LIM (2002) On-farm feeding and feed management in aquaculture. Hasan& New (2013))3Feed and Feeding Practices in Aquaculture. Davis (2015)
Electronic References, Websites	https://www.fao.org/fishery/ar

Practical Course Description

1. Course Name:
Fish Diet Technology / Practical
2. Course Code:
FDTC316
3. Semester / Year:
First Semester / 2024-2025
4. Description Preparation Date:
02/01/2025
5. Available Attendance Forms:
Attendance in the laboratory and field visits
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours per week / 1.5 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Sadiq Jwad Muhammed Email: sadiq.muhammed@uobasrah.edu.iq
8. Course Objectives

Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students the basic aspects of aquaculture farm design. • Teach students the basic aspects of aquaculture hatchery design. • Teach students the basic concepts of establishing and managing earthen ponds, cages, recirculating aquaculture system, aquaponics and biofloc systems. • Teach students the engineering aspects of automated feeding systems. • Teach students on the nature and types of basic materials and equipment used in aquaculture systems.

9. Teaching and Learning Strategies

Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to identify the basic aspects of aquaculture engineering.	General introduction Review the most important engineering matters related to aquaculture farms.	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	3 hours	Students will be able to differentiate between production units in aquaculture based on density, control, location of culture, etc.	Classification of production units Review examples of production units according to classifications based on density, control, location of farming, etc.	• Practical lecture • Presentation • Group discussion	Quick test Students identify the appropriate type for a group of production units mentioned in the questions

Third	3 hours	Students will be able to design and construct earthen ponds and handle the equipment and supplies for them.	Design and construction of earthen ponds 1 Design ponds on paper or using computer programs. Determine the cross-section of the plug. Calculate the amounts of soil that need to be added or removed. Determine the area and method of constructing the fish collection pit, drainage gates, supply channels and their requirements. Review and identify the equipment used in supplying and draining water. Review and identify the equipment used in aerating the ponds. Calculate the amounts of water needed and the time period for filling and draining the ponds.	• Practical lecture • Presentation • Group discussion	Solving practical problems
Fourth	3 hours	Students will be able to design and construct earthen ponds.	Design and construction of earthen ponds 2 Field visit to the fish ponds at the Al-Hartha Station farm or to one of the fish farms in the governorate.	• Explanation by the subject teacher • Explanation by the farm management	Discussion between students and between them and the subject teacher or farm management
Fifth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 1 Choose the appropriate location for the cages and the conditions that must be met. Review the materials used in the manufacture of cages and the advantages and disadvantages of each. Learn about the methods of constructing cages and the tools used in them. Determine the culture densities that can be used depending on the water specifications, location and type of fish.	• Practical lecture • Viewing samples of materials and equipment • Performing calculations using mathematical methods	Solving practical problems
Sixth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 2 Field visit to one of the cage farm sites in the governorate. Or practical application to create miniature model cages.	• Explanation by the subject teacher • Explanation by the farm management in the event of a field visit	Discussion between students and between them and the subject teacher or farm management in the event of a field visit or evaluation of models prepared by students
Seventh	3 hours	None	First monthly exam	None	None
Eighth	3 hours	Students will be able to identify the materials used and how to handle them for recirculating aquaculture system.	Design and construction of recirculating aquaculture system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, calculate culture densities.	• Practical lecture • Presentation • Video	Discussion and oral questions

Ninth	3 hours	Students will be able to identify the basics of designing and constructing an aquaponic system.	Design and construction of an aquaponic system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, types of plant culture platforms and materials used in them, calculate fish and plant culture densities and their types within the system.	• Practical lecture • Presentation • Video	Discussion and oral questions
Tenth	3 hours	Students will be able to identify the basics of operating a biofloc system.	Operation of the biofloc system Identify the equipment and tools used in the system. Identify the microorganisms used and how to prepare them for addition to the system. Identify the methods used to monitor water properties and microorganism densities within the system. Field visit to the department's aquaponics system and compare it with the closed system and the biofloc system.	• Practical lecture • Presentation • Video	A report discussing the system that is most suitable for the local environment and the most feasible for application and use among closed, aquaponic and biofloc farming systems locally
Eleventh	3 hours	Students will be able to identify the engineering aspects of automatic feeding systems.	Automated feeding systems Learn about modern automated feeding systems and the basics of their work and the materials and techniques used in their manufacture and operation.	• Practical lecture • Presentation • Video	Discussion and oral questions
Twelfth	3 hours	Students will be able to identify methods and equipment for transporting live fish.	Live fish transport Learn about the methods of transporting live fish and the equipment and supplies related to them and their differences according to the type, size and number of fish transported.	• Practical lecture • Presentation • Video	Assigning students to transport a group of live fish by different means
Thirteenth	3 hours	Students will be able to learn the basics of monitoring devices and follow up on the specifications of the water used for cultivation.	Devices and monitoring Learn about the basic components of measuring devices, review water specification measuring devices, water speed and quantity measuring devices, water pressure loss and leakage measuring devices, water level determination devices, fish counting devices, system monitoring equipment and software, and how to use each one.	• Practical lecture • Presentation • Video	Discussion and oral questions
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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. 5 marks for attendance, participation and answering oral questions 5 marks for reports and projects 5 marks for the first monthly exam 5 marks for the second monthly exam 20 marks for the final exam 40 marks total 60 marks for the theoretical part

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering,
Electronic References, Websites	https://www.fao.org/fishery/ar

Theoretical Course Description

1. Course Name:
Osteichthyes classification
2. Course Code:
OSTX314
3. Semester / Year:
First semester/ 2024-2025
4. Description Preparation Date:
3 /9/ 2024
5. Available Attendance Forms:
Full time (theoretical lecture/practical lecture)
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hours per week for 15 weeks/ 2 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Jassim M. Abed Email:jassim1961abed@gmail.com

8. Course Objectives	
Course Objectives Graduating students who are able to:	• **Working in the field of environmental sciences, they have theoretical and applied knowledge of the subject of Fish classification** • **Obtaining the skills required for a postgraduate plan (postgraduate studies).** • **Thinking and analysis skills that enable access to knowledge of diagnosing and categorizing wandering species and studying their distribution, density and relationship to the aquatic environment.**
9. Teaching and Learning Strategies	
Strategy	1 - Enable students to obtain knowledge and understanding of the relationship of fish to the food chain. 2- Enabling students to obtain knowledge and understanding of fish classification. 3- Enabling students to obtain knowledge and understanding of the methods used in fish collection. 4- Enabling students to obtain knowledge and understanding of how to use the fish classification keys. 5- Introducing the student to laboratory work, applying theoretical information and linking it to the reality of laboratory work

10. Course Structure					
Week	**Hours**	**Required learning**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**
1	**2**	Introduce students to general information about fish classification.	**General introduction to fish classification**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
2	**2**	Introduce students to vertebrates	The phylogeny of vertebrates, the origin and evolution of fish	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
3	**2**	Explanation and clarification of extinct groups	**Placodermi** groups of extinct fish	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
4	**2**	Clarification and explanation of fish for lobed or fleshy fins	**Sarcopterygii**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
5	**2**	Lung fish elucidation and distribution	Lung fish **Dipnoi fish**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
6	**2**	Explanation and clarification of the groups belonging to chondrostes fish	**Chondrostei**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
7	**2**	Explanation and clarification of the groups belonging holostes fish	**Holostei**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
8	**2**	Clarification and explanation of modern fully teleost fish	**Teleostei**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
9	**2**	None	Monthly Exam	None	None
10	**2**	An illustration of the groups belonging to herring	**Elopomorpha**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports

11	**2**	Explanation and clarification of the subgroups of Otocephala	**Otocephala**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
12	**2**	Clarification and explanation of the species belonging to the order Cyprinds and its spread	**Cypriniformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
13	**2**	Continuation Clarification and explanation of the species belonging to the order Cyprinds and its distribution	**Cypriniformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
14	**2**	Clarification and explanation of the species belonging to the order of spiny fins and their spread	**Perciformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
15	**2**	Supplement the clarification and explanation of the species belonging to the order of spiny fins and their spread	**Perciformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion

11. Course Evaluation

Distribution of 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.
10 points for presentation
10 points for homework
10 points for monthly exam
20 points for practical
50 points for final exam

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	N. K. Al- Daham: Fishes of Iraq and the Arabian Gulf (part 1, 2 and 3)
Main References (Sources)	Brian Coad (2010). Freshwater Fishes of Iraq
Recommended Books and References (Scientific Journals, Reports...)	Many research papers have been published on fish classification
Electronic References, Websites	https://www.Fishbase.de

Practical Course Description

1. Course Name:
Osteichthyes classification
2. Course Code:
OSTX314
3. Semester / Year:
First semester/ 2024-2025
4. Description Preparation Date:
3 /9/ 2024
5. Available Attendance Forms:
Full time (theoretical lecture/practical lecture)
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hours per week for 15 weeks/ 1.5 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Jassim M. Abed Email:jassim1961abed@gmail.com
8. Course Objectives

Course Objectives Graduating students who are able to:	• **Working in the field of environmental sciences, they have theoretical and applied knowledge of the subject of Fish classification** • **Obtaining the skills required for a postgraduate plan (postgraduate studies).** • **Thinking and analysis skills that enable access to knowledge of diagnosing and categorizing wandering species and studying their distribution, density and relationship to the aquatic environment.**
9. Teaching and Learning Strategies	
Strategy	1 - Enable students to obtain knowledge and understanding of the relationship of fish to the food chain. 2- Enabling students to obtain knowledge and understanding of fish classification. 3- Enabling students to obtain knowledge and understanding of the methods used in fish collection. 4- Enabling students to obtain knowledge and understanding of how to use the fish classification keys. 5- Introducing the student to laboratory work, applying theoretical information and linking it to the reality of laboratory work
10. Course Structure	

Week	**Hours**	**Required learning**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**
1	**3**	**Introducing students to general information about fish classification.**	**General introduction to fish classification and use of the taxonomic key, External appearance and taxonomic characteristics of fish**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
2	**3**	**Introducing students to the clupeid fish**	**Clupeiformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
3	**3**	**Explanation and classification of cyprinids fish**	**Aulopiformes and Cypriniformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
4	**3**	**Explanation and classification of cyprinids fish**	**Supplement of Cypriniformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
5	**3**	**Explanation and classification of cyprinids fish**	**Supplement of Cypriniformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
6	**3**	None	**Monthly Exam**	None	None
7	**3**	**Explanation, clarification and classification of the cat fish**	**Siluriformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
8	**3**	**Explanation, explanation and classification of pipefish and goby**	**Syngnathiformes and Gobiiformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
9	**3**	**Explanation, clarification and classification of mackerel and acanthurids fish**	Scombriformes & Acanthuriformes	None	None
10	**3**	**Explanation, explanation and classification of carangids fish**	**Carangiformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
11	**3**	None	**Monthly Exam**	None	None

12	**3**	**Explanation, explanation and classification of carangids fish**	**Supplement of Carangiformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
13	**3**	**Explanation, explanation and classification of needle fishes & teethed cyprinids**	**Beloniformes & Cyprinodontiformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion
14	**3**	**Clarification, explanation and classification of tilapia and bream fish**	**Cichliformes & Mugiliformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
15	**3**	**Explanation, explanation and classification of percids fishes**	**Perciformes**	Theoretical and practical lectures + presentation methods + dialogue and discussion	Questions and oral discussion

11. Course Evaluation

Distribution of the score out of 40 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly, or written exams, reports, etc.
10 marks for homework
10 marks for the monthly exam
20 marks for final practical

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	N. K. Al- Daham: Fishes of Iraq and the Arabian Gulf (part 1, 2 and 3)
Main References (Sources)	Brian Coad (2010). Freshwater Fishes of Iraq
Recommended Books and References (Scientific Journals, Reports...)	Many research papers have been published on fish classification
Electronic References, Websites	https://www.Fishbase.de

Course Description Biochemistry

1. Course Name
Biochemistry / Theoretical
Course Code .2
BICH330
3. Semester/Year
Second Semester/ 2024-2025
Date of preparation of this description .4
15/ 9/ 2024
5. Available attendance forms
Full Time (Theoretical Lecture/Practical Lecture)
6. Number of credit hours (total) / number of units (total)
Two hours
7. Course administrator's name (if more than one name is mentioned)
Email: fatima.sultan@uobasrah.edu.iq Name: Prof. Fatima Abdel Hussein Mohamed
8. Course Objectives

1- Teaching the student how to identify chemical compounds and provide him with sufficient information that enables him to understand the vital activities taking place in the human body at the molecular level, and apply them with practical lessons. 2- - The ability to understand the metabolic life processes that occur within the body 3- Knowing the defect resulting in any of the food metabolic pathways and the consequent severe health damage in the body. 4- Understand the role that regulated enzymes play in metabolic reactions 5- Know the biological importance of nutrient metabolism pathways and their fate within the body.	Course Objectives

9. Teaching and learning strategies	
- Interactive Teaching Method (Interactive Lecture) - Use the style of discussion and dialogue and ensure the involvement of students - The use of experiential education in conjunction with theoretical lectures with the practical part - The use of educational techniques, modern programs and means of demonstration in lectures	Strategy

10. Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Introduction to Biochemistry	Definition of biochemistry and life molecules and the basic life	2	1
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Cellular Respiration	Definition of cellular respiration and steps to extract energy from	2	2
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Carbohydrates Carbohydrates	Chemical definition and introduction to carbohydrates, The importance of	2	3
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Carbohydrates Carbohydrates	The structural formula of monosaccharides, their classification,	2	4
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Carbohydrates Carbohydrates	Epimers Chiral (Assymetric) Carbon Isomers	2	5
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Proteins	definition of proteins, their importance, division and structural	2	6
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Amino acids and peptides	Amino acids and peptides - their classification and vital importance	2	7

auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Fat Lipids	Definition of fats, their functions, classification, composition and	2	8
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Vitamins	Definition, importance, types, classification	2	9
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Enzymes	Definition, types and importance	2	10
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Hormones	Definition, types and importance	2	11
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Metabolism	Definition of carbohydrate metabolism	2	12
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views	Metabolism	Metabolism of proteins and fats	2	13
auditions Daily & Monthly Final and Reports Daily	Lectures Theoretical and practical + Views		Exam and access to student reports	2	14

11. Course Evaluation

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

12. Learning and Teaching Resources

No	Required textbooks (methodology, if any)
Introduction to Biochemistry - written by Prof. Dr. Khawla Ahmed Al Falih Biochemistry - written by Prof. Dr. Qusai Abdul Qader Chalabi	Key references (sources)

Journal of Science and Technology on Biochemistry Iraqi National Journal of Chemical Sciences - University of Babylon Arab Journal of Chemistry	Recommended supporting books and references (scientific journals, reports...)
hemistry-https://ask https://www.dirassataldokturah.com	Electronic references, websites

Course Description Biochemistry

1. Course Name
Biochemistry / Practical
Course Code .2
BICH330
3. Semester/Year
Second Semester/ 2024-2025
Date of preparation of this description .4
15/ 9/ 2024
5. Available attendance forms
Full Time (Practical Lecture)
6. Number of credit hours (total) / number of units (total)
3 hours
7. Course administrator's name (if more than one name is mentioned)
Email: Prof. Fatima Abdel Hussein Mohamed Name: fatima.sultan@uobasrah.edu.iq
8. Course Objectives

1- Teaching the student how to identify chemical compounds and provide him with sufficient information that enables him to understand the vital activities taking place in the human body at the molecular level, and apply them with practical lessons. 2- - The ability to understand the metabolic life processes that occur within the body 3- Knowing the defect resulting in any of the food metabolic pathways and the consequent severe health damage in the body. 4- Understand the role that regulated enzymes play in metabolic reactions 5- Know the biological importance of nutrient metabolism pathways and their fate within the body.	Course Objectives

9. Teaching and learning strategies

- Interactive Teaching Method (Interactive Lecture) - Use the style of discussion and dialogue and ensure the involvement of students - The use of experiential education in conjunction with theoretical lectures with the practical part - The use of educational techniques, modern programs and means of demonstration in lectures	Strategy

10. Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning	Hours	Week
Daily tests and reports	Practical lectures + discussion	Introduction to Biochemistry	define biochemistry and basic	3	1
& Tests Reports	Laboratory experiments	Cellular respiration	Understanding the steps of cellular respiration and	3	2
& Tests Reports	Practical lectures + practical	Carbohydrates	Definition of carbohydrates and their importance	3	3
& Tests Reports	Experiments on sugars	Carbohydrates	Study the structural formula of	3	4

& Tests Reports	Practical lectures + discussion	Carbohydrates	Understanding epimers and kerali carbon	3	5
& Tests Reports	Experiments on proteins	Proteins	Definition of proteins and their importance	3	6
& Tests Reports	Laboratory experiments	Amino acids and peptides	Study of amino acids and peptides	3	7
& Tests Reports	Practical lectures + practical	fats	Definition of fats and their functions	3	8
& Tests Reports	Practical lectures + experiments	Vitamins	Definition of vitamins and their importance	3	9
& Tests Reports	Laboratory experiments	Enzymes	Study of enzymes and their types	3	10
& Tests Reports	Practical lectures + discussion	Hormones	Understanding hormones and their importance	3	11
& Tests Reports	Practical experiences	Metabolism	Definition of metabolism and its importance	3	12
& Tests Reports	Applied activities	Metabolism	Carbohydrate metabolism study	3	13
Tests & Reports	Laboratory experiments	Metabolism	Study of protein and lipid metabolism	3	14

11. Course Evaluation

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

12. Learning and Teaching Resources

No	Required textbooks (methodology, if any)
Introduction to Biochemistry - written by Prof. Dr. Khawla Ahmed Al Falih Biochemistry - written by Prof. Dr. Qusai Abdul Qader Chalabi	Key references (sources)

Journal of Science and Technology on Biochemistry Iraqi National Journal of Chemical Sciences - University of Babylon Arab Journal of Chemistry	Recommended supporting books and references (scientific journals, reports...)
hemistry-https://ask https://www.dirassataldokturah.com	Electronic references, websites

Theoretical Course Description

1. Course Name:	
Aquaculture Engineering / Theoretical	
2. Course Code:	
AQEN322	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Riyadh A. Irmayla	Email: riyadh.irmayla@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students the basic aspects of aquaculture farm design. • Teach students the basic aspects of aquaculture hatchery design. • Teach students the basic concepts of establishing and managing earthen ponds, cages, recirculating aquaculture system, aquaponics and biofloc systems. • Teach students the engineering aspects of automated feeding systems. • Teach students on the nature and types of basic materials and equipment used in aquaculture systems.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Students will be able to identify the basic aspects of aquaculture engineering.	General Introduction	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Students will be able to differentiate between production units in aquaculture based on density, control, location, etc.	Classification of Production Units	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used production units
Third	2 hours	Students will be able to design and construct earthen ponds.	Design and Construction of Earthen Ponds 1	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Students will be able to design and construct earthen ponds.	Design and Construction of Earthen Ponds 2	• Theoretical lecture • Presentation • Group discussion Video	Earth pond design project
Fifth	2 hours	Students will be able to identify the materials used and how to handle them in cage construction.	Design and Construction of Cages 1	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Sixth	2 hours	Students will be able to identify the materials used and how to handle them in cage construction.	Design and Construction of Cages 2	• Theoretical lecture • Presentation • Group discussion Video	Cage design project
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Students will be able to identify the materials used and how to handle them in closed culture systems.	Design and Construction of Recirculating Aquaculture System	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Students will be able to identify the basics of designing and constructing an aquaponic system.	Design and Construction of Aquaponics System	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	Students will be able to identify the basics of operating a biofloc system.	Operation of Biofloc System	• Theoretical lecture • Presentation • Group discussion Video	Comparative report between closed culture systems, aquaponics and biofloc
Eleventh	2 hours	Students will be able to identify the engineering aspects of automated feeding systems.	Automatic Feeding Systems	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Students will be able to identify methods and equipment for transporting live fish.	Live Fish Transport	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Students will be able to learn the basics of monitoring devices and follow up on the specifications of the water used for cultivation.	Instruments and Monitoring	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering,
Electronic References, Websites	https://www.fao.org/fishery/ar

Practical Course Description

1. Course Name:	
Aquaculture Engineering / Practical	
2. Course Code:	
AQEN322	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Sadiq Jwad Muhammed	Email: sadiq.muhammed@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students the basic aspects of aquaculture farm design. • Teach students the basic aspects of aquaculture hatchery design. • Teach students the basic concepts of establishing and managing earthen ponds, cages, recirculating aquaculture system, aquaponics and biofloc systems. • Teach students the engineering aspects of automated feeding systems. • Teach students on the nature and types of basic materials and equipment used in aquaculture systems.
9. Teaching and Learning Strategies	

Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to identify the basic aspects of aquaculture engineering.	General introduction Review the most important engineering matters related to aquaculture farms.	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	3 hours	Students will be able to differentiate between production units in aquaculture based on density, control, location of culture, etc.	Classification of production units Review examples of production units according to classifications based on density, control, location of farming, etc.	• Practical lecture • Presentation • Group discussion	Quick test Students identify the appropriate type for a group of production units mentioned in the questions
Third	3 hours	Students will be able to design and construct earthen ponds and handle the equipment and supplies for them.	Design and construction of earthen ponds 1 Design ponds on paper or using computer programs. Determine the cross-section of the plug. Calculate the amounts of soil that need to be added or removed. Determine the area and method of constructing the fish collection pit, drainage gates, supply channels and their requirements. Review and identify the equipment used in supplying and draining water. Review and identify the equipment used in aerating the ponds. Calculate the amounts of water needed and the time period for filling and draining the ponds.	• Practical lecture • Presentation • Group discussion	Solving practical problems
Fourth	3 hours	Students will be able to design and construct earthen ponds.	Design and construction of earthen ponds 2 Field visit to the fish ponds at the Al-Hartha Station farm or to one of the fish farms in the governorate.	• Explanation by the subject teacher • Explanation by the farm management	Discussion between students and between them and the subject teacher or farm management
Fifth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 1 Choose the appropriate location for the cages and the conditions that must be met. Review the materials used in the manufacture of cages and the advantages and disadvantages of each. Learn about the methods of constructing cages and the tools used in them. Determine the culture densities that can be used depending on the water specifications, location and type of fish.	• Practical lecture • Viewing samples of materials and equipment • Performing calculations using mathematical methods	Solving practical problems

Sixth	3 hours	Students will be able to identify the materials used and how to handle them for cage construction.	Design and construction of cages 2 Field visit to one of the cage farm sites in the governorate. Or practical application to create miniature model cages.	• Explanation by the subject teacher • Explanation by the farm management in the event of a field visit	Discussion between students and between them and the subject teacher or farm management in the event of a field visit or evaluation of models prepared by students
Seventh	3 hours	None	First monthly exam	None	None
Eighth	3 hours	Students will be able to identify the materials used and how to handle them for recirculating aquaculture system.	Design and construction of recirculating aquaculture system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, calculate culture densities.	• Practical lecture • Presentation • Video	Discussion and oral questions
Ninth	3 hours	Students will be able to identify the basics of designing and constructing an aquaponic system.	Design and construction of an aquaponic system Review the basic components of the system including tanks and their types, water pipes and their types, mechanical and biological filters and their types, water sterilization devices, water oxygen supply devices, materials used to get rid of chemical compounds and regulate pH, types of plant culture platforms and materials used in them, calculate fish and plant culture densities and their types within the system.	• Practical lecture • Presentation • Video	Discussion and oral questions
Tenth	3 hours	Students will be able to identify the basics of operating a biofloc system.	Operation of the biofloc system Identify the equipment and tools used in the system. Identify the microorganisms used and how to prepare them for addition to the system. Identify the methods used to monitor water properties and microorganism densities within the system. Field visit to the department's aquaponics system and compare it with the closed system and the biofloc system.	• Practical lecture • Presentation • Video	A report discussing the system that is most suitable for the local environment and the most feasible for application and use among closed, aquaponic and biofloc farming systems locally
Eleventh	3 hours	Students will be able to identify the engineering aspects of automatic feeding systems.	Automated feeding systems Learn about modern automated feeding systems and the basics of their work and the materials and techniques used in their manufacture and operation.	• Practical lecture • Presentation • Video	Discussion and oral questions

Twelfth	3 hours	Students will be able to identify methods and equipment for transporting live fish.	Live fish transport Learn about the methods of transporting live fish and the equipment and supplies related to them and their differences according to the type, size and number of fish transported.	• Practical lecture • Presentation • Video	Assigning students to transport a group of live fish by different means
Thirteenth	3 hours	Students will be able to learn the basics of monitoring devices and follow up on the specifications of the water used for cultivation.	Devices and monitoring Learn about the basic components of measuring devices, review water specification measuring devices, water speed and quantity measuring devices, water pressure loss and leakage measuring devices, water level determination devices, fish counting devices, system monitoring equipment and software, and how to use each one.	• Practical lecture • Presentation • Video	Discussion and oral questions
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering,
Electronic References, Websites	https://www.fao.org/fishery/ar

Course Description Form

1. Course Name: Artificial Breeding	
2. Course Code:ARB419	
3. Semester / Year: Semester: Second- 2025	
4. Description Preparation Date: 17/2/2025	
5. Available Attendance Forms: Presence	
6. Number of Credit Hours (Total)/Number of Units (Total)	
2 hours per week for 14 week	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: D. Ahmed MuhsenMojer Email:ahmedmojer@ubasrah.edu.com Prof. Asst. RajaaAbid Ali raja.abdali@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	• **Identify the concept of artificial propagation.** **Practicing the crossbreedingbetween fish** • **Conducting taxation operations between different species of fish** • **Identify the reproductive characteristics of fish species** • **Identify the stages of development of gametes and fish embryos**
9. Teaching and Learning Strategies	
Strategy	**Knowledge understanding and developing students mental applied and general skills**
10. Course Structure	

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
1	2	Introducing students to information about fish	General Introduction	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning
2	2	Introducing students to the effect of internal	Factors affecting the creation and development of gametogenesis	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning
3	2	Introducing students to the requirements of raising and caring for Brooder	Fish biology of locally fish which used in reproduction	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
4	2	Introducing students to how to care for	Management of brooder fish	Presentation, discussion and dialogue	Semester Exam, Daily Participation,
5	2	Introducing students to the advantages and disadvantages of internal education and	Inbreeding and negative impact on Iraqi brood stock	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
6	2	Introducing students to the methods used to feed brood fish and how to manage	The method of breeding and feeding brooder fish	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
7	2		Examination		
8	2	Introducing students to the basics and requirements of navigable	Fish multiplication in a wave multiplication methods	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to

9	2	Introducing students to the components of the typical hatchery for	Artificial breeding - typical fish hatchery components	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to
10	2	Introducing students to how to perform	Artificial propagation steps	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning
11	2	Introduce students to the basic requirements for breeding and raising fi	Larvae Culture	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to
12	2	Introducing the most important types of local fish that can be multiplied with an indication of the	Artificial breeding of local Iraqi fish – Cyprinidae	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
13	2	Introducing students to the most important types of marine fish that can be multiplied	Breeding marine fish from the Mugillidae and Sparinidaefamilies	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
14	2	Introducing students to the important basics in how to manage fish	Hatcheries Management	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to
15	2	Introducing some fish breeding techniques, the most prominent hormones used for	Complementary Technics	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation

11. Course Evaluation	
Distribution of 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. 1- 20% for the semester exam 2- 20% for presentations 3- 10% for the student's effectiveness in participating in the lecture	
12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	----
Main References (Sources)	Fish Reproduction biology
Recommended Books and References (Scientific Journals, Reports...)	Methods in Reproductive Aquaculture Mass Production Eggs And Early Fry
Electronic References, Websites	Publications of the World Food Organization (FAO)

Theoretical Course Description

1. Course Name:					
Fisheries Managements					
2. Course Code:					
FSMN424					
3. Semester / Year:					
Second, 2024-2025					
4. Description Preparation Date:					
5-1-2025					
5. Available Attendance Forms:					
Full time (theoretical lecture)					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week for 14 weeks/ 2 units					
7. Course Administrator's Name (Mention All, If More Than One Name)					
Name: Jassim M. Abed Email: jassim1961abed@gmail.com					
8. Course Objectives					
Course Objectives: Graduating students who are able to:	* Working in the field of fisheries, they have theoretical and applied knowledge of the subject of fisheries management. *Submission of external examinations by local / regional / international organizations. *Thinking and analytical skills that enable knowledge of threats and damages to which fisheries may be exposed.				
9. Teaching and Learning Strategies					
Strategy	1- Enabling students to acquire knowledge and understanding of fisheries. 2- To enable students to acquire knowledge and understanding of the methods used in fisheries management. 3. To enable students to acquire knowledge and understanding of the methods used to achieve sustainable fisheries.				
10. Course Structure					
Week	**Hours**	**Required learning outcomes**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**

1	**2**	Introduce students to general information about fisheries.	General introduction to fisheries management	Theoretical lectures + presentation methods + dialogue and discussion	Discussion and oral questions
2	**2**	Introducing students to fisheries	The need for fisheries management	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
3	**2**	Explanation and clarification of the of Lakes management	Management of Freshwater Fisheries in Africa	Theoretical lectures + presentation methods + dialogue and discussion	Discussion and oral questions
4	**2**	Clarify and explain the challenges of managing freshwater fisheries	Challenges of managing freshwater fisheries in Africa	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
5	**2**	Clarification of fisheries in Iraq	Developing of fisheries management in Iraq	Theoretical lectures + presentation methods + dialogue and discussion	Discussion and oral questions
6	**2**	Explanation and clarification of the importance of the Iraqi marshes	Recommendations for the reconstruction of the marshes	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
7	**2**	Explanation and clarification of the importance of the Iraqi Marshes and their management	Managing the Marshes of Iraq	Theoretical lectures + presentation methods + dialogue and discussion	Discussion and oral questions
8	**2**	Explanation and clarification of fisheries management approaches	The ecosystem approach to fisheries: history and institutional foundation	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
9	**2**	None	Monthly Exam	None	None
10	**2**	Clarification and explanation of collaborative and community	Define collaborative management	Theoretical lectures + presentation methods + dialogue and discussion	Discussion and oral questions
11	**2**	An explanation of the importance of surveying in the management of water bodies	Fish survey of lakes, ponds and reservoirs	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
12	**2**	Explanation and clarification of the capacity and productivity of the water body	carrying capacity, productivity and growth	Theoretical lectures + presentation methods + dialogue and discussion	Discussion and oral questions

13	**2**	Clarify and explain the methods of avoiding summer and winter doom	Winter and Summer killing	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports
14	**2**	Clarification and explanation of the main groups of fish enemies	fish enemies	Theoretical lectures + presentation methods + dialogue and discussion	Discussion and oral questions
15	**2**	Continuation clarification and explanation of the main groups of fish enemies	fish enemies	Theoretical lectures + presentation methods + dialogue and discussion	Daily, monthly and final exams and daily reports

11. Course Evaluation

Distribution of 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.
10 points for attendance, participation and answering oral questions
10 points for reports
10 points for presentation
10 points for homework
10 points for the monthly exam
50 points for the final exam

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	
Main References (Sources)	Garstky, Tobias and Amr Zuhair (2013). Managing biodiversity and ecosystems in the marshes of southern Iraq - a survey study on a potential World Heritage nomination. Ammaan Jordan.
Recommended Books and References (Scientific Journals, Reports...)	Published research related to fisheries management
Electronic References, Websites	Webs related to fisheries managements

Theoretical Course Description

1. Course Name:	
Aquaculture / Theoretical	
2. Course Code:	
AQUA413	
3. Semester / Year:	
First Semester / 2024-2025	
4. Description Preparation Date:	
02/09/2024	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week (30 hours per semester) / 2 units (2 units)	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Professor Dr. Riyadh A. Irmayla	Email: riyadh.irmayla@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Introduce students to the concept of aquaculture. • Identify different aquaculture systems. • Understand the basic living requirements of cultured organisms. • Identify common diseases in aquaculture farms and methods of prevention and control, both pharmacological and environmental. • Provide students with skills in designing and operating aquaculture systems. • Apply the principles of sustainability and environmental protection in aquaculture. • Encourage research and innovation in aquaculture techniques. • Promote critical thinking and scientific research in the field.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry, and brainstorming. • Report-based learning and projects.

10. Course Structure

Week	Hours	Required learning outcomes	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	**By the end of this lesson, the student will be able to:** ✓ Understand the concept of aquaculture and its various types (fish, crustaceans, molluscs, algae). ✓ Explain the importance of aquaculture to food security and economic development. ✓ Distinguish between different aquaculture systems (such as open, semi-closed, and closed systems). ✓ Identify the environmental and economic factors affecting the success of aquaculture projects. ✓ Review the historical development of aquaculture globally and locally. ✓ Discuss the challenges and future opportunities in the aquaculture sector. ✓ Use basic aquaculture terminology and concepts in scientific discussions.	**General Introduction to Aquaculture**	• Theoretical lecture • Presentation • Group discussion	Discussion and questions

Second	2 hours	**By the end of this lesson (and the next one), the student will be able to:** ✓ Understand the general concept of aquaculture systems and their basic components. ✓ Distinguish between different aquaculture systems, such as earthen ponds, floating cages, enclosures, coastal culture, aquaponics, recirculating aquaculture, and biofloc systems. ✓ Explain the advantages and disadvantages of each aquaculture system in terms of environmental and economic efficiency. ✓ Analyze the factors affecting the selection of the appropriate culture system (such as the type of organism being cultured, available resources, and geographical location). ✓ Link the requirements of each culture system to the targeted production type. ✓ Compare the efficiency of resource use (such as water and energy) in each of the different	**Aquaculture Systems 1**	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and questions
Third	2 hours	**By the end of this lesson, the student will be able to:** ✓ Understand the general concept of aquaculture systems and their basic components. ✓ Distinguish between different aquaculture systems, such as earthen ponds, floating cages, enclosures, coastal culture, aquaponics, recirculating aquaculture, and biofloc systems. ✓ Explain the advantages and disadvantages of each aquaculture system in terms of environmental and economic efficiency. ✓ Analyze the factors affecting the selection of the appropriate culture system (such as the type of organism being cultured, available resources, and geographical location). ✓ Link the requirements of each culture system to the targeted production type. ✓ Compare the efficiency of resource use (such as water and energy) in each of the different systems.	**Aquaculture Systems 2**	• Theoretical lecture • Presentation • Group discussion • Video presentations	• Discussion and questions • Report on the most suitable and locally used production systems

Fourth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Identify the basic environmental factors affecting aquaculture systems (such as temperature, salinity, oxygen, pH, ammonia, etc.). ✓ Explain the effect of each environmental factor on the growth and health of cultured organisms. ✓ Distinguish between different culture environments (warm water, cold water, fresh water, brackish water, and marine water) and the requirements of each. ✓ Identify the optimal limits for physical and chemical factors to ensure a healthy and stable culture environment. ✓ Discuss seasonal or sudden environmental changes and how to adapt to them in culture systems. ✓ Analyze the relationship between aquatic environment quality and culture system productivity. ✓ Evaluate environmental risks that may threaten aquaculture, such as pollution or climate change. ✓ Propose effective environmental management strategies to improve the performance of culture systems.	**Culture Environment**	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and questions
Fifth	2 hours	Nothing	**First Monthly Exam**	Nothing	Nothing

Sixth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Identify the main species of aquatic organisms farmed (fish, crustaceans, molluscs, algae, etc.). ✓ Distinguish between the characteristics of different species of farmed organisms in terms of growth, nutrition, and environmental tolerance. ✓ Explain the scientific and economic reasons for selecting specific species in aquaculture projects. ✓ Farmed aquatic organisms are classified according to the culture environment (warm water, cold water, fresh water, brackish water, or marine). ✓ Identify the environmental and nutritional requirements of each farmed species. ✓ Discuss the challenges associated with the farming of certain species, such as diseases or slow growth. ✓ Compare the production and economic efficiency of different species. ✓ Analyze the environmental and ethical considerations associated with aquaculture.	**Cultured Aquatic Organisms**	• Theoretical lecture • Presentation • Group discussion • Video presentations	• Discussion and questions • Report on the cultivation of a species of aquatic organism
Seventh	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explains the basic principles of designing various types of aquaculture farms (open, closed, or semi-closed). ✓ Identifies factors affecting farm site selection (such as soil type, water availability, infrastructure, and proximity to markets). ✓ Draws a preliminary design diagram for an aquaculture farm, including the main sections (breeding, culturing, feeding, treatment, and drainage units). ✓ Explains how to regulate water flow, feeding, and aeration within the system to ensure efficient operation. ✓ Distinguishes between the technical and administrative requirements for operating different aquaculture systems. ✓ Analyzes the operational and capital costs associated with farm design and management. ✓ Discusses strategies for managing risks and ensuring sustainable production in aquaculture. ✓ Evaluates overall farm performance and suggests design or management improvements to achieve maximum production efficiency.	**Farm Design and Management**	• Theoretical lecture • Presentation • Group discussion • Video presentations	• Discussion and questions • Preparing a design for a fish farm, including all administrative and technical aspects.

Eighth	2 hours	**By the end of this lesson (and the next one), the student will be able to:** ✓ Explain the biological and environmental characteristics of carp, including common carp species used in aquaculture, such as common carp, silver carp, and grass carp. ✓ Identify the appropriate environmental requirements for carp farming, such as temperature, dissolved oxygen, water quality, and the culture systems used. ✓ Identify the different systems used in carp farming, including pond farming, floating cages, and closed systems. ✓ Explain the methods of carp spawning and propagation, both natural and artificial, and determine the optimal conditions for successful spawning. ✓ Design a management plan for carp farming, including nutrition, stocking density, health management, and water quality. ✓ Identify common challenges in carp farming and propose appropriate solutions, such as disease, unbalanced nutrition, or poor water quality. ✓ Analyze the economic feasibility of carp fish farms and compare production efficiency with other farmed fish species. ✓ Propose practical solutions to improve the efficiency of carp farming systems and reduce losses resulting from mismanagement or unsuitable environmental conditions.	**Freshwater Fish Farming, Carp 1**	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and questions

Ninth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the biological and environmental characteristics of carp, including common carp species used in aquaculture, such as common carp, silver carp, and grass carp. ✓ Identify the appropriate environmental requirements for carp farming, such as temperature, dissolved oxygen, water quality, and the culture systems used. ✓ Identify the different systems used in carp farming, including pond farming, floating cages, and closed systems. ✓ Explain the methods of carp spawning and propagation, both natural and artificial, and determine the optimal conditions for successful spawning. ✓ Design a management plan for carp farming, including nutrition, stocking density, health management, and water quality. ✓ Identify common challenges in carp farming and propose appropriate solutions, such as disease, unbalanced nutrition, or poor water quality. ✓ Analyze the economic feasibility of carp fish farms and compare production efficiency with other farmed fish species. ✓ Propose practical solutions to improve the efficiency of carp farming systems and reduce losses resulting from mismanagement or unsuitable environmental conditions.	**Freshwater Fish Farming, Carp 2**	• Theoretical lecture • Presentation • Group discussion • Video presentations	• Discussion and questions • Preparing a report on a case study of a local or international carp farm
Tenth	2 hours	Nothing	**Second Monthly Exam**	Nothing	Nothing

Eleventh	2 hours	**By the end of this lesson, the student will be able to:** ✓ Describe the biological characteristics of tilapia, including farmed species, feeding behavior, and growth rate. ✓ Identify the environmental requirements for tilapia farming, such as temperature, water quality, and optimal oxygen levels. ✓ Explain the systems used in tilapia farming, such as earthen ponds, floating cages, and closed systems. ✓ Distinguish between tilapia spawning and propagation methods, including natural and artificial propagation. ✓ Apply nutritional management principles and determine appropriate diets for tilapia according to growth stages. ✓ Analyze common challenges in tilapia farming and propose effective technical and management solutions. ✓ Estimate the economic feasibility of tilapia farming projects by understanding the underlying costs and returns.	**Freshwater Fish Farming, Tilapia**	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and questions
Twelfth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Describe the biological characteristics of sobaity, including feeding behavior, growth, and reproduction. ✓ Identify the environmental requirements for sobaity farming, such as temperature, salinity, oxygen, and marine water quality. ✓ Explain common sobaity farming methods, such as marine cage culture or coastal pond culture. ✓ Explain the steps of semi-artificial sobaity spawning and propagation, including spawning stimulation, egg collection, and larval rearing. ✓ Determine the nutritional requirements of sobaity at different stages and select appropriate feeds to achieve high growth rates. ✓ Analyze the technical and environmental challenges of sobaity farming, such as diseases, changes in water quality, or fingerling mortality. ✓ Estimate the economic feasibility of marine sobaity farms by calculating costs, feed conversion ratios, and expected returns.	**Marine Fish Farming, Sobaity**	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and questions

Thirteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the biological and environmental characteristics of farmed shrimp, such as the white shrimp (*Litopenaeus vannamei*) or the Indian shrimp (*Penaeus indicus*). ✓ Identify the environmental and chemical requirements suitable for shrimp farming, including temperature, salinity, oxygen, and sediment quality. ✓ Explain the stages of the shrimp life cycle from larvae to harvest, and identify the PL (post-larvae) stages. ✓ Explain the different methods of shrimp farming, such as semi-intensive and intensive culture, and earthen or cement ponds. ✓ Analyze appropriate feeding systems for shrimp at each age stage, and select feeds based on growth and feed conversion requirements. ✓ Discuss the most common shrimp diseases and methods of preventing them, such as whitehead syndrome or Vibrio bacteria. ✓ Estimate the economic feasibility of a shrimp farming project by comparing production costs and expected returns.	**Crustacean Farming, Shrimp**	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and questions
Fourteenth	2 hours	**By the end of this lesson, the student will be able to:** ✓ Explain the concept of sustainability in aquaculture and its importance in preserving environmental and economic resources in the long term. ✓ Identify the environmental and social challenges associated with unsustainable aquaculture, such as pollution, deterioration of water quality, and loss of biodiversity. ✓ Analyze sustainable aquaculture practices such as water recycling, the use of environmentally friendly feeds, and polyculture. ✓ Evaluate the impact of different aquaculture systems (open, semi-closed, closed) on the surrounding environment. ✓ Propose solutions and technologies that enhance the sustainability of aquaculture projects, including the use of renewable energy, bioremediation technologies, and environmental monitoring. ✓ Compare local and international models of sustainable aquaculture and identify success factors and challenges in each case.	**Sustainability of Aquaculture**	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and questions

Fifteenth	2 hours	**By the end of this course, the student will be able to:** ✓ Explain the concept of artificial intelligence and its basic applications in the field of aquaculture. ✓ Identify areas of AI use in improving aquaculture management, such as smart feeding, water quality monitoring, and early disease detection. ✓ Analyze AI models and techniques used to predict growth and production rates. ✓ Evaluate the benefits of AI in reducing costs and increasing production efficiency in aquaculture. ✓ Identify the challenges and obstacles associated with applying AI technologies in local aquatic environments. ✓ Propose smart digital solutions or software tools to support decision-making in fish farm operations. ✓ Compare traditional and AI-enabled aquaculture systems in terms of performance and efficiency.	**Artificial Intelligence AI General Review**	• Theoretical lecture • Presentation • Group discussion • Answering students' inquiries	Nothing

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering, Narendra Publishing House, New Delhi.
Electronic References, Websites	https://www.fao.org/fishery/ar

Practical Course Description

1. Course Name:	
Aquaculture / Practical	
2. Course Code:	
AQUA413	
3. Semester / Year:	
First Semester / 2024-2025	
4. Description Preparation Date:	
02/09/2024	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Three hours per week (45 hours per semester) / One and a half units (one and a half units)	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Lecturer Dr. Ahmed M. Mojer	Email: ahmed.mojer@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Introduce students to the concept of aquaculture. • Identify different aquaculture systems. • Understand the basic living requirements of cultured organisms. • Identify common diseases in aquaculture farms and methods of prevention and control, both pharmacological and environmental. • Provide students with skills in designing and operating aquaculture systems. • Apply the principles of sustainability and environmental protection in aquaculture. • Encourage research and innovation in aquaculture techniques. • Promote critical thinking and scientific research in the field.
9. Teaching and Learning Strategies	

Strategy	• Practical lectures in the laboratory and field visits.. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning outcomes	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	**By the end of this lesson, the student will be able to:** ✓ Understand the concept of aquaculture and its various types (fish, crustaceans, molluscs, algae). ✓ Explain the importance of aquaculture to food security and economic development. ✓ Distinguish between different aquaculture systems (such as open, semi-closed, and closed systems). ✓ Identify the environmental and economic factors affecting the success of aquaculture projects. ✓ Review the historical development of aquaculture globally and locally. ✓ Discuss the challenges and future opportunities in the aquaculture sector. ✓ Use basic aquaculture terminology and concepts in scientific discussions.	**General Introduction to Aquaculture**	• Video presentations and photos of aquaculture systems. • A tour to view the recirculating aquaculture system in the department's laboratories, the aquaponics system, and the fish tanks on the university campus.	Discussion and questions

Second	3 hours	**By the end of this lesson (and the next one), the student will be able to:** ✓ Apply basic principles in designing an aquaculture system suitable for a specific environment. ✓ Determine the components of aquaculture systems (e.g., tanks, pumps, filters, aeration systems). ✓ Construct a simple aquaculture system using tools and equipment available in the laboratory or on-farm. ✓ Implements operating and maintenance procedures for various aquaculture systems. ✓ Observe the behavior of cultured organisms and assess their health status within the system. ✓ Analyze operational problems that may arise during system management and propose appropriate solutions. ✓ Adhere to occupational health and safety procedures when handling equipment and organisms. ✓ Accurately documents field data and uses it to prepare technical reports.	**Aquaculture Systems 1**	• Practical lecture • Presentation • Group discussion	Discussion and questions
Third	3 hours	**By the end of this lesson (and the next one), the student will be able to:** ✓ Apply basic principles in designing an aquaculture system suitable for a specific environment. ✓ Determine the components of aquaculture systems (e.g., tanks, pumps, filters, aeration systems). ✓ Construct a simple aquaculture system using tools and equipment available in the laboratory or on-farm. ✓ Implements operating and maintenance procedures for various aquaculture systems. ✓ Observe the behavior of cultured organisms and assess their health status within the system. ✓ Analyze operational problems that may arise during system management and propose appropriate solutions. ✓ Adhere to occupational health and safety procedures when handling equipment and organisms. ✓ Accurately documents field data and uses it to prepare technical reports.	**Aquaculture Systems 2**	• Practical lecture • Presentation • Group discussion	**Quick Quiz:** Students identify the appropriate category for a set of production systems mentioned in the questions. **Homework:** Prepare technical report.

Fourth	3 hours	**By the end of this lesson (and the next one), the student will be able to:** ✓ Measures physical and chemical parameters of water, such as temperature, dissolved oxygen, pH, salinity, ammonia, and others, using laboratory or field instruments and devices. ✓ Uses environmental measuring devices correctly and safely, such as oxygen meters, pH meters, conductivity meters, and others. ✓ Accurately records environmental readings and analyzes the results to assess the quality of the aquatic environment. ✓ Evaluates the compatibility of current environmental conditions with the optimal requirements of cultured organisms. ✓ Monitors environmental changes in the culture system and identifies factors that negatively impact the health of cultured organisms. ✓ Implements corrective actions to improve water quality when deviations from optimal values are found. ✓ Adheres to occupational safety procedures when taking samples and handling chemicals. ✓ Prepares a comprehensive operational report that includes environmental results, their analysis, and recommendations for improving the environmental performance of the system.	**Culture Environment**	• Practical lecture • Presentation • Practical application	**Field Assessment:** Evaluate students' performance while working in the laboratory or field to measure environmental factors. **Quick Quiz:** A test of the actions to be taken when a problem occurs with an environmental factor in the culture system. **Homework:** Prepare a technical report.
Fifth	3 hours	Nothing	**First Monthly Exam**	Nothing	Nothing

Sixth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Identify common species of cultured aquatic organisms (such as fish, crustaceans, molluscs, algae, etc.). ✓ Distinguish between different species using visible morphological and anatomical characteristics. ✓ Identify the growth and developmental stages of each cultured species through field or laboratory examination. ✓ Identify the environmental and nutritional requirements of each cultured aquatic organism. ✓ Estimate the economic feasibility of culturing each cultured aquatic organism. ✓ Determine the appropriate culture method for each cultured aquatic organism. ✓ Apply basic culture care procedures (such as feeding, aeration, water changes, etc.). ✓ Participate in counting, weighing, and bio-classification of cultured species for research or marketing purposes. ✓ Accurately document biological data and field observations in a work record. ✓ Adhere to hygiene and biosafety regulations when handling living organisms and the aquatic environment.	**Cultured Aquatic Organisms**	• Practical lecture • Presentation • Practical application • **Field visit** to one of the aquaculture systems on campus or at the Hartha station	• Discussion between students, between them and the subject teacher, or the farm management. • Preparing a report about the visit.

Seventh	3 hours	**By the end of this lesson (and the next one), the student will be able to:** ✓ Draws a simplified practical design plan for an aquaculture farm based on space criteria, system type, and the needs of the cultured organisms. ✓ Uses measuring and planning tools to determine the dimensions of the culture ponds and system components (such as feed lines, water drainage, and aeration). ✓ Implements a practical, small-scale or pilot aquaculture system in a laboratory or field setting. ✓ Installs basic infrastructure components (such as pumps, filters, and oxygen units) and tests their operational efficiency. ✓ Implements daily farm management and operation procedures, such as feeding, water quality monitoring, and growth monitoring. ✓ Detects system malfunctions or technical problems and proposes practical solutions. ✓ record activities and experiments conducted in practical reports, including drawings, observations, and suggestions. ✓ Adheres to occupational safety procedures while designing and operating the aquaculture system.	**Farm Design and Management**	• Practical lecture • Presentation • Practical application	A practical report including drawings, notes and suggestions.

Eighth	3 hours	**By the end of this lesson (and the next one), the student will be able to:** ✓ Preparing ponds for carp fingerlings, including pond cleaning, soil treatment, and water quality control. ✓ Implementing the proper and safe transfer and distribution of carp fingerlings within ponds to reduce stress and mortality. ✓ Measuring and analyzing water quality indicators (such as temperature, dissolved oxygen, pH) using laboratory methods or field tools. ✓ Implementing daily feeding procedures for carp and determining appropriate feed quantities based on age, size, and density. ✓ Monitoring fish behavior and identifying signs of disease or environmental stress. ✓ Recording and analyzing field data related to growth, nutrition, and water quality to monitor production performance. ✓ Participating in partial or full carp harvests and estimating weight, size, and total production.	**Freshwater Fish Farming, Carp 1**	• Practical lecture • Presentation • Video presentations	Discussion and questions
Ninth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Preparing ponds for carp fingerlings, including pond cleaning, soil treatment, and water quality control. ✓ Implementing the proper and safe transfer and distribution of carp fingerlings within ponds to reduce stress and mortality. ✓ Measuring and analyzing water quality indicators (such as temperature, dissolved oxygen, pH) using laboratory methods or field tools. ✓ Implementing daily feeding procedures for carp and determining appropriate feed quantities based on age, size, and density. ✓ Monitoring fish behavior and identifying signs of disease or environmental stress. ✓ Recording and analyzing field data related to growth, nutrition, and water quality to monitor production performance. ✓ Participating in partial or full carp harvests and estimating weight, size, and total production.	**Freshwater Fish Farming, Carp 2**	Field visit to a carp fish farm	Field visit report
Tenth	3 hours	Nothing	**Second Monthly Exam**	Nothing	Nothing

Eleventh	3 hours	**By the end of this lesson, the student will be able to:** ✓ Preparing ponds for tilapia fingerlings, including pond cleaning, soil treatment, and water quality control. ✓ Implementing proper and safe transfer and distribution of tilapia fingerlings within ponds to reduce stress and mortality. ✓ Measuring and analyzing water quality indicators (such as temperature, dissolved oxygen, pH) using laboratory methods or field tools. ✓ Implementing daily feeding procedures for tilapia and determining appropriate feed quantities based on age, size, and density. ✓ Monitoring fish behavior and identifying signs of disease or environmental stress. ✓ Recording and analyzing field data related to growth, nutrition, and water quality to monitor production performance. ✓ Participating in partial or full tilapia harvests and estimating weight, size, and total production.	**Freshwater Fish Farming, Tilapia**	• Practical lecture • Presentation • Video presentations	Discussion and questions
Twelfth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Prepare sea cages or ponds used for sobaity farming according to technical conditions appropriate for the marine environment. ✓ Carry out the process of receiving sobaity fingerlings and distributing them into the farming systems in a manner that minimizes stress and ensures high survival rates. ✓ Measure basic environmental indicators at the marine farming site (such as salinity, temperature, oxygen, and water transparency) using appropriate field tools. ✓ Implement daily feeding protocols for sobaity, determining the appropriate amount of feed based on fish weight and rearing conditions. ✓ Monitor the phenotypic behavior of fish in cages or ponds and identify any abnormal signs indicating health or environmental problems. ✓ Participate in preventive fish health monitoring, including taking samples for examination or implementing treatment programs. ✓ Estimate the biological weight and growth rate of sobaity using weighing and measuring tools, and accurately document field data.	**Marine Fish Farming, Sobaity**	• Practical lecture • Presentation • Video presentations	Discussion and questions

Thirteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Prepare earthen or cement ponds designated for shrimp farming, including cleaning, drying, and fertilizing, according to technical protocols. ✓ Implement the process of receiving shrimp fry (PLs) and adapting them to the rearing environment in a practical and safe manner. ✓ Regularly measure water quality using field tools, such as salinity, temperature, oxygen, ammonia, and pH. ✓ Implement manual or automated feeding procedures for shrimp according to density and size, while monitoring feeding behavior. ✓ Periodically monitor growth and estimate shrimp biomass using hand traps or nets and weighing devices. ✓ Identify visible signs of disease or environmental stress in shrimp and take initial treatment or isolation measures. ✓ Participate in harvesting and estimating total production and survival rates, accurately recording field data.	**Crustacean Farming, Shrimp**	• Practical lecture • Presentation • Video presentations	Discussion and questions
Fourteenth	3 hours	**By the end of this lesson, the student will be able to:** ✓ Analyze a real or hypothetical case study of an aquaculture farm in terms of the type of system used, the species farmed, and productivity. ✓ Identify the technical or environmental problems facing the project and analyze their causes using field data and information. ✓ Implement practical steps to evaluate farm performance using indicators such as growth rates, feed conversion ratio (FCR), and water quality. ✓ Propose practical, implementable solutions to improve the efficiency and productivity of the aquaculture unit under study. ✓ Employ field observation and monitoring skills to collect and analyze data from the production site using simple evaluation tools. ✓ Participate in preparing a comprehensive practical report presenting the results of the case study and technical recommendations in an organized, scientific format.	**Case Studies and Practical Applications**	Student presentations on the case study they conducted	A comprehensive practical report presenting the results of the case study and recommendations.

Fifteenth	3 hours	**By the end of this course, the student will be able to:** ✓ Explain the concept of artificial intelligence and its basic applications in the field of aquaculture. ✓ Identify areas of AI use in improving aquaculture management, such as smart feeding, water quality monitoring, and early disease detection. ✓ Analyze AI models and techniques used to predict growth and production rates. ✓ Evaluate the benefits of AI in reducing costs and increasing production efficiency in aquaculture. ✓ Identify the challenges and obstacles associated with applying AI technologies in local aquatic environments. ✓ Propose smart digital solutions or software tools to support decision-making in fish farm operations. ✓ Compare traditional and AI-enabled aquaculture systems in terms of performance and efficiency.	**Artificial Intelligence AI** • Review of practical experiences using artificial intelligence in fish farming activities. **General Review**	• Practical lecture • Presentation • Video presentations • Group discussion • Answering students' inquiries	Nothing

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Ivar L.O. 2013. Aquaculture Engineering. John Wiley & Sons, Ltd.
Recommended Books and References (Scientific Journals, Reports...)	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering, Narendra Publishing House, New Delhi.
Electronic References, Websites	https://www.fao.org/fishery/ar

Theoretical Course Description

1. Course Name:	
Ecological Pollution/ Theoretical	
2. Course Code:	
ECPL426	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
25/ 02/ 2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Naeem S. Hammadi	Email: naeem.hammadi@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	Graduating students who are able to: - Raise awareness about the types of environmental pollution and their effects. - Develop research and analytical skills to understand environmental problems. - Promote critical thinking to discuss possible solutions to pollution. - Apply knowledge through practical activities. - Encourage individual and collective responsibility toward the environment.
9. Teaching and Learning Strategies	
Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.
10. Course Structure	

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Students will be able to identify general basic information about pollution and its types.	A general introduction to the definition of pollution and its types	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Students will be able to identify the sources and effects of air pollution.	Sources of air pollution and its effects	• Theoretical lecture • Presentation • discussion	he exams Daily and monthly And final reports Daily
Third	2 hours	Students will be able to identify the sources and effects of water pollution.	Sources of water pollution and its effects	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Students will be able to identify the causes and effects of soil pollution.	Causes and effects of soil pollution	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Fifth	2 hours	Students will be able to define noise pollution and its effects on health.	Definition of noise pollution and its effects on health	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Sixth	2 hours	Students will be able to identify the impact of plastic waste on the environment.	The impact of plastic waste on the environment	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Seventh	2 hours	**None**	**First monthly exam**	None	None
Eighth	2 hours	Students will be able to identify the relationship between pollution and climate change.	The relationship between pollution and climate change	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Students will be able to identify the sources of ocean pollution and its effects on marine life.	Sources of ocean pollution and their effects on marine life	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Tenth	2 hours	Students will be able to identify how pollution affects human health.	How does pollution affect human health?	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Eleventh	2 hours	Students will be able to identify laws and policies related to pollution.	Pollution laws and policies	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Twelfth	2 hours	Students will be able to identify technological innovations to combat pollution.	Technological innovations to combat pollution	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Students will be able to identify how civil society can contribute to reducing pollution.	How can civil society contribute to reducing pollution?	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	- American Heritage Dictionary. 1982. Boston, MA: Houghton Mifflin Company. - Bricker, S.B., et al. 1999. National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries. Silver Spring, MD: National Oceanic and Atmospheric Administration (NOAA), National Ocean Service. - Bricker, S., et al. 2004. National Estuarine Eutrophication Assessment Update: Workshop summary and recommendations for development of a long-term monitoring and assessment program. Silver Spring, MD: NOAA, National Ocean Service. - Chesapeake Bay Program. 2002. Reducing and Preventing Toxics Pollution. - Hill, M.S. 1997. Understanding Environmental Pollution. Cambridge, UK: Cambridge University Press.

Recommended Books and References (Scientific Journals, Reports...)	**Recommended Books** - Air Pollution, 1st Edition Greenhaven Publishing, 2011. ISBN-13: 9780737759457. - Atmospheric Transmission, Emission and Scattering, 1st Edition Elsevier Science, 2013. ISBN-13: 9780080983981. - Fundamentals of Geoenvironmental Engineering: Understanding Soil, Water, and Pollutant Interaction and Transport, 1st Edition Butterworth-Heinemann, 2018. ISBN-13: 9780128051450. - Soil Management and Climate Change: Effects on Organic Carbon, Nitrogen Dynamics, and Greenhouse Gas Emissions, 1st Edition Academic Press, 2018. ISBN-13: 9780128121290.
Electronic References, Websites	https://www.ametsoc.org/sloan/cleanair/ https://www.epa.gov/greatlakes [1]. https://www.epa.gov/aboutepa/about-office-water#wetlands

Practical Course Description

1. Course Name:
Ecological Pollution/ Practical
2. Course Code:
ECPL426
3. Semester / Year:
Second Semester / 2024-2025
4. Description Preparation Date:
25/ 02/ 2025
5. Available Attendance Forms:
Attendance in the laboratory and field visits
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hours per week / 1.5 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Dr. Naeem S. Hammadi Email: naeem.hammadi@uobasrah.edu.iq
8. Course Objectives

Course Objectives	Graduating students who are able to: - Raise awareness about the types of environmental pollution and their effects. - Develop research and analytical skills to understand environmental problems. - Promote critical thinking to discuss possible solutions to pollution. - Apply knowledge through practical activities. - Encourage individual and collective responsibility toward the environment.

9. Teaching and Learning Strategies

Strategy	• Practical lectures in the laboratory and field visits. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to discuss local examples of pollution.	Discuss local examples of pollution.	• Theoretical lecture • Presentation • discussion	the exams Daily and monthly And final reports Daily
Second	3 hours	Students will be able to measure the air quality in a particular area.	Measuring air quality in a specific area	• Theoretical lecture • Presentation • discussion	the exams Daily and monthly And final reports Daily
Third	3 hours	Students will be able to analyze samples from local water sources.	Analysis of samples from local water sources	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Fourth	3 hours	Students will be able to study a case of soil pollution in a particular area.	Case study of soil pollution in a specific area	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Fifth	3 hours	Students will be able to measure noise levels in different environments.	Measuring noise levels in different environments	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily

Sixth	3 hours	Students will be able to understand the plastic recycling project.	Plastic Recycling Project	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Seventh	3 hours	None	First monthly exam	None	None
Eighth	3 hours	Students will be able to discuss solutions to reduce carbon emissions.	Discussing solutions to reduce carbon emissions	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Ninth	3 hours	Students will be able to conduct a case study on pollution at a beach.	Case study on pollution on a beach	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Tenth	3 hours	Students will be able to understand and maintain public health.	Invitation of a public health specialist to give a lecture	• Theoretical lecture • Presentation • Group discussion • Video	he exams Daily and monthly And final reports Daily
Eleventh	3 hours	Students will be able to discuss a local law about the environment.	Discussion of a local law on the environment	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Twelfth	3 hours	Students will be able to discuss successful technology projects.	Showcasing successful technology projects	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Thirteenth	3 hours	Students will be able to identify the importance of a local awareness campaign.	Discussing the organization of a local awareness campaign	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	- American Heritage Dictionary. 1982. Boston, MA: Houghton Mifflin Company. - Bricker, S.B., et al. 1999. National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries. Silver Spring, MD: National Oceanic and Atmospheric Administration (NOAA), National Ocean Service. - Bricker, S., et al. 2004. National Estuarine Eutrophication Assessment Update: Workshop summary and recommendations for development of a long-term monitoring and assessment program. Silver Spring, MD: NOAA, National Ocean Service. - Chesapeake Bay Program. 2002. Reducing and Preventing Toxics Pollution. - Hill, M.S. 1997. Understanding Environmental Pollution
Recommended Books and References (Scientific Journals,	**Recommended Books** - Air Pollution, 1st Edition Greenhaven Publishing, 2011. ISBN-13: 9780737759457.
Electronic References, Websites	https://www.ametsoc.org/sloan/cleanair/ https://www.epa.gov/greatlakes [1]. https://www.epa.gov/aboutepa/about-office-water#wetlands https://www.epa.gov/nps https://www.epa.gov/nps

Theoretical Course Description

1. Course Name:	
Fish diseases and parasites	
2. Course Code:	
Fish Diseases and Parasites / Q401	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
2023 /9 /15	
5. Available Attendance Forms:	
Full time (theoretical lecture/practical lecture)	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours per week for 14 weeks	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Prof. Dr. Khalidah Salim Al-Niaeem	khalidah_salim@yahoo.com
8. Course Objectives	
Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students the basic aspects of aquaculture farm design. • Teach students the basic aspects of aquaculture hatchery design. • Teach students the basic concepts of establishing and managing earthen ponds, cages, recirculating aquaculture system, aquaponics and biofloc systems. • Teach students the engineering aspects of automated feeding systems. • Teach students on the nature and types of basic materials and equipment used in aquaculture systems.
9. Teaching and Learning Strategies	

Strategy	• Obtaining the skills required for the post-graduation plan (postgraduate studies). • Applying for external tests by local/regional/international bodies. • Graduating students who are able to • - Diagnose infections in fish and the best methods of prevention and treatment. - Thinking and analytical skills that enable reaching knowledge of diagnosing and classifying the types of parasites that harm fish farms in particular. - Providing students with skills to work in scientific and research laboratories and study pathology and its relationship to fish wealth.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	5 hours	Introducing students to general information about fish diseases and parasites.	General introduction (animal relationships; parasites and disease; zoonoses; enemies of fish).	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	5 hours	Introduce students to the adaptations of parasites.	Parasitism and parasitoids - (impact of parasite on host; host response; types of parasites and .types of hosts) - Parasite adaptations (fixation and feeding adaptations; reduction and organlessness adaptations; physiological adaptations; reproductive adaptations; life cycle matching; protective adaptations during transmission).	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used production units
Third	5 hours	Explain and illustrate the life cycles of fish parasites and symptoms of fish infection.	Parasite life cycles (importance of studying life cycles; classification of life cycles; examples of parasite life cycles) - Symptoms of fish infection (fish behavior; fish color; fish	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	5 hours	Introducing students to a group of important and most common fish diseases.	Viral and bacterial diseases.	• Theoretical lecture • Presentation • Group discussion Video	Earth pond design project

Fifth	5 hours	First monthly exam			
Sixth	5 hours	Introducing students to another group of fish diseases.	- Fungal diseases	• Theoretical lecture • Presentation • Group discussion Video	Cage design project
Seventh	5 hours	Explanation of the most important primary animals that infect fish.	Protozoa parasitizing fish.	None	None
Eighth	5 hours	Explanation of the most important flatworms that infect fish, especially farmed fish.	Flatworms parasitizing fish	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	5 hours	Definition of nematodes and spiny-headed worms that parasitize farmed fish.	-Nematodes - Acanthocephalus parasitizing fish.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Tenth	5 hours		Second monthly exam		
Eleventh	5 hours	Definition of the group of leeches, crustaceans and oyster larvae that parasitize fish	Leeches, crustaceans and oyster larvae parasitizing fish	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	5 hours	A detailed explanation of environmental diseases and nutritional deficiency diseases that occur in fish.	Environmental diseases and nutritional deficiency diseases in fish.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	5 hours	Introducing students to genetic diseases that occur in fish.	Genetic diseases in fish.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	5 hours	None	Second Monthly Exam	None	None

11. Course Evaluation

Distribution of 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. 5 marks for attendance, participation and answering oral questions 5 marks for reports and projects 10 marks for the first monthly exam 10 marks for the second monthly exam 30 marks for the final exam Total 60 marks 40 marks for the practical part

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	Diseases and Parasites of Iraqi Fish, authored by Dr. Farhan Damd Muhaisin, 1983.
Main References (Sources)	- Fish diseases by Noga, 2010 -Behrmann-Godel, J. (2015). Disease Agents and Parasites of Carp. In book: Biology and Ecology of Carp. - Molnár, K., Székely, C. and Láng, M. (2019). Field guide to the control of warmwater fish diseases in Central and Eastern Europe, the Caucasus and Central Asia. FAO Fisheries and Aquaculture
Recommended Books and References (Scientific Journals, Reports...)	Fish illnesses How to spot them https://www.tetra-fish.com/learning-center/troubleshooting/fish-illnesses-how-to-spot-them.aspx Publishing House, New Delhi.
Electronic References, Websites	- https://www.fsai.ie/faq/fish_parasites.html -https://vfa.vic.gov.au/operational-policy/pests-and-diseases/some-parasites-of-freshwater-fish -https://www.usgs.gov/ecosystems/fish-wildlife-disease/diseases-aquatic-organisms/parasitic-diseases-wild-fish?qt-science_support_page_related_con=0#qt-science_support_page_related_con

Course Description

1. Course Name:	
Fish Processing / Theoretical	
2. Course Code:	
FSTC420	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
20/2/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Prof. Dr. Jalal Mohammed Essa Alnoor	Email: jalal.essa@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Equip students with skills in fish processing. • Identify types of fish suitable for various processing methods based on their chemical composition. • Understand the nutritional and economic value of fish. • Explore the potential use of fish by-products in producing various food, health, and industrial products.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures inside classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry-based learning, and brainstorming. • Project- and report-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Introduction to the importance of fish processing	Introduction to the importance and development of fish processing	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Explain important parts of the fish	Weight composition of fish and yield percentage	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used
Third	2 hours	Explain chemical components of the fish	Chemical composition and nutritional value of fish	• Theoretical lecture • Presentation • Group discussion	Discussion and oral questions
Fourth	2 hours	Explain postmortem changes	Changes occurring in fish after death	• Theoretical lecture • Presentation • Group	Earth pond design project
Fifth	2 hours	Methods of preserving and processing fish	Introduction to fish preservation methods	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Sixth	2 hours	Explain freezing preservation method	Fish preservation by freezing	• Theoretical lecture • Presentation • Group	Cage design project
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Explain fish chilling methods	Fish preservation by chilling	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Ninth	2 hours	Explain salting methods	Fish preservation by salting	• Theoretical lecture • Presentation • Group	Discussion and oral questions

Tenth	2 hours	Explain drying methods	Fish preservation by drying	• Theoretical lecture • Presentation • Group	Comparative report between closed
Eleventh	2 hours	Explain smoking methods	Fish preservation by smoking	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Twelfth	2 hours	Explain canning methods	Fish preservation by canning	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Thirteenth	2 hours	Explain the importance of fish by-products	Different uses of fish by-products	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students'	None

11. Course Evaluation

Grades are distributed out of 100 according to tasks such as daily preparation, daily and oral exams, monthly and written exams, and reports, etc.
• 40% for the midterm exam.
• 10% for active participation in lectures.

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Al-Tai (1987)
Recommended Books and References (Scientific Journals, Reports...)	Published research related to fish meat technology
Electronic References, Websites	Various links related to fish meat technology.

Practical Course Description

1. Course Name:	
Fish Marketing	
2. Course Code:	
FSMK4174	
3. Semester / Year:	
First Semester / 2024-2025	
4. Description Preparation Date:	
20/2/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Prof. Dr. Jalal Mohammed Essa Alnoor	Email: jalal.essa@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Identify the types of fish found in Iraq. • Understand the requirements of live fish during marketing. • Learn the possibilities of using various preservation methods during marketing. • Equip students with skills in the field of fish marketing and its relation to supply and demand in the market.
9. Teaching and Learning Strategies	

Strategy	• Enable students to gain knowledge and understanding of fish marketing. • Enable students to understand the relationship between marketing and food economics. • Enable students to understand the methods used in fish marketing. • Enable students to understand the preservation techniques for marketed fish.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Introduce students to the importance of fish wealth	General introduction to the importance of fish wealth	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	2 hours	Clarify marketing goals and key elements	Marketing goals and main components	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Third	2 hours	Explain marketing services and operations	Marketing services and operations	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Fourth	2 hours	Clarify technical and biological fundamentals for transporting live fish	Technical and biological basics of transporting live fish	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Fifth	2 hours	Identify key factors in fish processing	Important factors in fish processing	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Sixth	2 hours	Explain fish preservation methods	Fish preservation methods	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Seventh	2 hours	Clarify the fish	Fish chilling	None	None
Eighth	2 hours	Clarify fish freezing methods	Fish freezing	• Practical lecture • Presentation • Group	Discussion and oral questions

Ninth	2 hours	Introduce students to fish inspection and evaluation	Fish inspection	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Tenth	2 hours	Follow up on signs of fish spoilage	Signs of fish spoilage	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Eleventh	2 hours	Clarify methods of fish fraud	Methods of fish fraud	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Twelfth	2 hours	Clarify fish packaging and preservation materials	Fish packaging and preservation materials	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Thirteenth	2 hours	Explain fish product storage	Storage of fish products	• Practical lecture • Presentation • Video	Discussion and oral questions
Fourteenth	2 hours	None	Second monthly exam	None	None
Fifteenth	2 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

• Grades are distributed out of 100 based on student tasks such as daily attendance, oral and written quizzes, monthly exams, written reports, etc.

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	FAO, (2022). *The State of World Fisheries and Aquaculture. Sustainability in action.* Rome. Farivar, S.; Jalil-Piran, Z.; Zarei, F. and Hosseinzadeh-Sahafi, H. (2017). *Intraspecific phylogeography of the Japanese threadfin bream, Nemipterus japonicus (Perciformes: Nemipteridae), from the Persian Gulf and Indo-West Pacific: A preliminary study based on mitochondrial DNA sequence.* Iranian Journal of Fisheries Sciences, 16 (2): 587 – 604
Recommended Books and References (Scientific Journals, Reports...)	Published research related to fish marketing
Electronic References, Websites	Various links related to fish marketing

Theoretical Course Description

1. Course Name:	
Artificial Breeding/ Theoretical	
2. Course Code:	
ARBR 419	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Ahmed Muhsen Mojer Prof. Asst. Rajaa Abid Ali	Email: ahmedmojer@ubasrah.edu.com
8. Course Objectives	
Course Objectives	• Teach students about the main types of fish breeding. • Introducing students to the components of the industrial breeding hatchery for fish. • Teaching students how to perform artificial breeding of fish inside the hatchery. • Teaching students how to extract the pituitary gland of fish, methods of conservation and how to use it to stimulate fish breeding. • Introduce students to the stages of embryonic and larval development of fish. • Teaching students how to incubate fish larvae and fingerlings in aquaculture ponds.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Introducing students to information about fish breeding and factors affecting reproduction	General Introduction	• Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Second	2 hours	Introducing students to the effect of internal factors and hormones affecting the maturity of sex gametes	Factors affecting the creation and development of gametogenesis	• Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Third	2 hours	Introducing students to the requirements of raising and caring for Brooder prepared for reproduction	Fish biology of locally fish which used in reproduction	• Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Fourth	2 hours	Introducing students to how to care for and feed brood fishes	Management of brooder fish	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Fifth	2 hours	Introducing students to the advantages and disadvantages of internal education and hybridization between closely related species	Inbreeding and negative impact on Iraqi brood stock	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Sixth	2 hours	Introducing students to the methods used to feed brood fish and how to manage ponds	The method of breeding and feeding brooder fish	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Introducing students to the basics and requirements of navigable natural propagation	Fish multiplication in a wave multiplication methods	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Ninth	2 hours	Introducing students to the components of the typical hatchery for fish multiplication with an indication of the importance of each component	Artificial breeding - typical fish hatchery components	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation

Tenth	2 hours	Introducing students to how to perform artificial fish breeding and its sequential steps	Artificial propagation steps	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Eleventh	2 hours	Introduce students to the basic requirements for breeding and caring for fish larvae	Larvae Culture	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Twelfth	2 hours	Introducing the most important types of local fish that can be multiplied with an indication of the requirements for how to conduct the breeding process	Artificial breeding of local Iraqi fish – Cyprinidae	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Thirteenth	2 hours	Introducing students to the most important types of marine fish that can be multiplied locally and the breeding methods used	Breeding marine fish from the Mugillidae and Sparinidae families	Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	Introducing some fish breeding techniques, the most prominent hormones used for multiplication, and how to calculate the amounts of hormonal doses	Complementary Technics	• Presentation, discussion and dialogue	Semester Exam, Daily Participation, Assigning students to presentation

11. Course Evaluation

Distribution of 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.

5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Fish Reproduction biology Artificial breeding and Hatchery management
Recommended Books and References (Scientific Journals, Reports...)	Methods in Reproductive Aquaculture
Electronic References, Websites	https://www.fao.org/fishery/ar

Practical Course Description

1. Course Name:	
Artificial Breeding / Practical	
2. Course Code:	
ARBR 419	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
02/01/2025	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Ahmed Muhsen Mojer	Email: ahmedmojer@ubasrah.edu.com
8. Course Objectives	
Course Objectives	• Teach students the engineering aspects of aquaculture systems. • Teach students about the main types of fish breeding. • Introducing students to the components of the industrial breeding hatchery for fish. • Teaching students how to perform artificial breeding of fish inside the hatchery. • Teaching students how to extract the pituitary gland of fish, methods of conservation and how to use it to stimulate fish breeding. • Introduce students to the stages of embryonic and larval development of fish. • Teaching students how to incubate fish larvae and fingerlings in aquaculture ponds.
9. Teaching and Learning Strategies	

Strategy	• Practical lectures inside the laboratory and field visits. • Presentations and video materials. Group discussions. • Problem-based learning, inquiry and brainstorming. • Learning based on reports and projects.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to understand fish breeding methods and how to apply them in practice.	Introduction in Fish Breeding	• Practical lecture • Presentation • Group discussion	A practical test in how to make the basic. requirements for multiplication
Second	3 hours	The student should be able to understand the work of each component of the hatchery and what it does.	Components of fish hatchery.	• Practical lecture • Presentation • Group discussion	A practical test through which students explain the work of each part of the hatchery
Third	3 hours	Students will be able to design and construct a fish breeding hatchery.	Scientific trip to the hatchery of the Marine Science Center for the Exploration of Freshwater Fish.	• Practical lecture	Explanation of the lecture on the site
Fourth	3 hours	Students will be able to design and construct earthen ponds.	Design and construction of earthen ponds 2 Field visit to the fish ponds at the Al-Hartha Station farm or to one of the fish farms in the governorate.	• Explanation by the subject teacher • Explanation by the farm management	Discussion between students and between them and the subject teacher or farm management
Fifth	3 hours	Students are able to extract the pituitary gland in several types of fish and preserve it in chemical solutions..	Extract the pituitary gland.	Explanation by the subject Lecture. Explanation by a technician in multiplication	Practical action on how to extract and preserve the gland
Sixth	3 hours	Students will be able to know the types of hormones used in the multiplication, the characteristics of each of them, and the recommended dose of the hormone for each type of fish.	Types of Common hormones used in artificial breeding of fish.	Explanation by the professor of the material for the hormones used in multiplication and a statement of the most important properties.	Practical test on knowing the type of hormone rejected and how to use it.
Seventh	3 hours	None	First monthly exam	None	None

Eighth	3 hours	Students will be able to perform artificial propagation of common local species.	Artificial Breeding of Fish.	Explanation by the subject Lecture and technician in multiplication. Video.	Discussion on the steps of artificial breeding of fish and the requirements for their completion
Ninth	3 hours	Students are able to determine how many brood fish are required to increase in the hatchery and how to calculate the amount of hormones needed for injections.	Estimating the number of fish brooder required for breeding and caring for them.	• Practical lecture • Presentation • Video	Discussion and oral questions
Tenth	3 hours	Students are mathematically calculated equations and applied to practical reality.	Scientific trip to the breeding hatchery.	A practical explanation in the hatchery on the blindness of calculating the weights of mothers and the amount of hormone required for injection and how to prepare them	Practical practice.
Eleventh	3 hours	Students will be able to learn the basics of caring for newly hatched larvae and how to feed them inside the hatchery.	Incubation of eggs, cultivation and feeding of newly hatched larvae.	• Practical lecture • Presentation • Video	A report discusses the most important foods used to feed the larvae, how to prepare them and the proportions of nutrition.
Twelfth	3 hours	Students are able to understand the larval development stages of fish and the characteristics of each stage.	Larval stages development.	• Practical lecture • Presentation • Video	Discussion and oral questions.
Thirteenth	3 hours	Students are able to prepare and grow natural and lab-grown food and how to feed fish larvae and juveniles in care ponds.	The use of natural foods and processed diets in feeding fish larvae and juveniles.	• Practical lecture • Presentation • Video	Assigning students to make special diets and develop natural food within the laboratory.
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.

5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Fish Reproduction biology. Artificial breeding of fish and management.
Recommended Books and References (Scientific Journals, Reports...)	Methods in Reproductive Aquaculture. Mass Production Eggs And Early Fry Narendra Publishing House, New Delhi.
Electronic References, Websites	https://www.fao.org/fishery/ar

Theoretical Course Description

1. Course Name:	
Fish Processing / Theoretical	
2. Course Code:	
FSTC420	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
20/2/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Prof. Dr. Jalal Mohammed Essa Alnoor	Email: jalal.essa@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Equip students with skills in fish processing. • Identify types of fish suitable for various processing methods based on their chemical composition. • Understand the nutritional and economic value of fish. • Explore the potential use of fish by-products in producing various food, health, and industrial products.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures inside classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry-based learning, and brainstorming. • Project- and report-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Introduction to the importance of fish processing	Introduction to the importance and development of fish processing	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Explain important parts of the fish	Weight composition of fish and yield percentage	• Theoretical lecture • Presentation • discussion	Report on the most suitable and locally used
Third	2 hours	Explain chemical components of the fish	Chemical composition and nutritional value of fish	• Theoretical lecture • Presentation • Group discussion	Discussion and oral questions
Fourth	2 hours	Explain postmortem changes	Changes occurring in fish after death	• Theoretical lecture • Presentation • Group	Earth pond design project
Fifth	2 hours	Methods of preserving and processing fish	Introduction to fish preservation methods	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Sixth	2 hours	Explain freezing preservation method	Fish preservation by freezing	• Theoretical lecture • Presentation • Group	Cage design project
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Explain fish chilling methods	Fish preservation by chilling	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Ninth	2 hours	Explain salting methods	Fish preservation by salting	• Theoretical lecture • Presentation • Group	Discussion and oral questions

Tenth	2 hours	Explain drying methods	Fish preservation by drying	• Theoretical lecture • Presentation • Group	Comparative report between closed
Eleventh	2 hours	Explain smoking methods	Fish preservation by smoking	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Twelfth	2 hours	Explain canning methods	Fish preservation by canning	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Thirteenth	2 hours	Explain the importance of fish by-products	Different uses of fish by-products	• Theoretical lecture • Presentation • Group	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students'	None

11. Course Evaluation

Grades are distributed out of 100 according to tasks such as daily preparation, daily and oral exams, monthly and written exams, and reports, etc.
• 40% for the midterm exam.
• 10% for active participation in lectures.

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Al-Tai (1987)
Recommended Books and References (Scientific Journals, Reports...)	Published research related to fish meat technology
Electronic References, Websites	Various links related to fish meat technology.

Practical Course Description

1. Course Name:	
Fish Processing / Theoretical	
2. Course Code:	
FSTC420	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
20/2/2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Prof. Dr. Jalal Mohammed Essa Alnoor	Email: jalal.essa@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Enable students to learn fish preservation methods. • Enable students to assess freshness and quality of fish products. • Enable students to develop fish processing operations. • Develop thinking and analytical skills for establishing fish by-products collection stations.
9. Teaching and Learning Strategies	

Strategy	• Practical sessions in the laboratory and field visits. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry-based learning, and brainstorming. • Project- and report-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Introduction to the importance of fish processing	Introduction to the importance and development of fish processing	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Second	3 hours	Explain important parts of the fish	Weight composition of fish and yield percentage	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Third	3 hours	Explain chemical components of the fish	Chemical composition and nutritional value of fish	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Fourth	3 hours	Explain postmortem changes	Changes occurring in fish after death	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Fifth	3 hours	Introduction to fish preservation methods	Methods of preserving and processing fish	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Sixth	3 hours	Explain freezing preservation method	Fish preservation by freezing	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Seventh	3 hours	None	First monthly exam	None	None
Eighth	3 hours	Explain fish chilling methods	Fish preservation by chilling	• Practical lecture • Presentation • Group	Discussion and oral questions

Ninth	3 hours	Explain salting methods	Fish preservation by salting	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Tenth	3 hours	Explain drying methods	Fish preservation by drying	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Eleventh	3 hours	Explain smoking methods	Fish preservation by smoking	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Twelfth	3 hours	Explain canning methods	Fish preservation by canning	• Practical lecture • Presentation • Group discussion	Discussion and oral questions
Thirteenth	3 hours	Explain the importance of fish by-products	Different uses of fish by-products	• Practical lecture • Presentation • Video	Discussion and oral questions
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Grades are distributed out of 100 according to tasks such as daily preparation, daily and oral exams, monthly and written exams, and reports, etc.
• 40% for the midterm exam.
• 10% for active participation in lectures.

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	Al-Tai (1987)
Recommended Books and References (Scientific Journals, Reports...)	Published research related to fish meat technology
Electronic References, Websites	Various links related to fish meat technology.

Theoretical Course Description

1. Course Name:
Marine Biology/ Theoretical
2. Course Code:
MWEN317
3. Semester / Year:
Second Semester / 2024-2025
4. Description Preparation Date:
25/ 02/ 2025
5. Available Attendance Forms:
Attendance in classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours per week / 2 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Dr. Naeem S. Hammadi Email: naeem.hammadi@uobasrah.edu.iq

8. Course Objectives	
Course Objectives	Graduating students who are able to: - Understand the biological and ecological foundations of the oceans. - Identify the diversity and importance of marine life. - Study marine ecosystems and interactions among marine organisms. - Analyze threats to marine life and ways to conserve them. - Develop research and observation skills in marine biology.

9. Teaching and Learning Strategies	
Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	**Hours**	**Required learning**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**

First	2 hours	Students will be able to identify general basic information about marine biology.	Introduction to Marine Biology Definition of Marine Biology Importance of Studying Marine Biology Historical Overview of Marine Biology	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Students will be able to identify different marine ecosystems.	Marine Ecosystems Theory: Explaining different ecosystems (coral reefs, oceans, etc.).	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Third	2 hours	Students will be able to identify biodiversity in the oceans.	Ocean Biodiversity: Marine Species and Classifications.	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Students will be able to identify marine microorganisms.	Marine Microbiology The role of microorganisms in the marine ecosystem.	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Fifth	2 hours	Students will be able to identify marine microorganisms.	Marine Microbiology The role of microorganisms in the marine ecosystem.	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Sixth	2 hours	Students will be able to identify some marine plant species and their importance.	Some species of marine plants and their importance	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Students will be able to identify and study the major types of marine animals.	Study of major marine animal species	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	Students will be able to identify interactions between marine organisms and their environment.	Interactions between marine organisms and their environment	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Tenth	2 hours	Students will be able to identify climate change in the oceans.	The impact of climate change on the oceans	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Eleventh	2 hours	Students will be able to identify the sources and effects of pollution on marine life.	Sources and impact of pollution on marine life	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Students will be able to identify strategies for conserving marine biodiversity.	Marine biodiversity conservation strategies.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	Students will be able to identify fishing methods and their impact on marine life.	Fishing methods and their impact on marine organisms.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation	
Distribution of 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. 5 marks for attendance, participation and answering oral questions 5 marks for reports and projects 10 marks for the first monthly exam 10 marks for the second monthly exam 30 marks for the final exam Total 60 marks 40 marks for the practical part	
12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	None
Main References (Sources)	- Miller, S. L., & Harley, J. P. (2017). Biology of the Marine Environment. 4th ed. New York: McGraw-Hill Education. - Castro, P. & Huber, M. (2016). Marine Biology. 9th ed. New York: McGraw-Hill Education. - Koehl, M. A. R. (2016). Marine Biology: An Ecological Approach. 2nd ed. New York: Pearson. - Birkhead, T. R., & Møller, A. P. (2018). Marine Biology: A Very Short Introduction. Oxford: Oxford University Press.
Recommended Books and References (Scientific Journals, Reports...)	- Hickman, J. R., & McLean, J. (2015). Marine Biology: A Comprehensive Overview. 2nd ed. New York: Wiley-Blackwell. - Budd, G. E., & Telford, M. J. (2009). The Origin and Evolution of the Marine Environment. Cambridge: Cambridge University Press. - Baker, A. C. (2003). Coral Reefs: A Very Short Introduction. Oxford: Oxford University Press. - Bennett, W. A., & McCarthy, J. (2019). Marine Biology: An Introduction to Marine Science. 3rd ed. Boston: Cengage Learning.

Electronic References, Websites	- https://www.marinebio.org/ - https://www.mba.ac.uk/ - https://www.fisheries.noaa.gov/ - https://oceanconservancy.org/ - https://seagrant.noaa.gov/ - https://www.mcsuk.org/ - https://www.theoceanagency.org/

Practical Course Description

1. Course Name:	
Marine Biology/ Practical	
2. Course Code:	
MWEN317	
3. Semester / Year:	
Second Semester / 2024-2025	
4. Description Preparation Date:	
25/ 02/ 2025	
5. Available Attendance Forms:	
Attendance in the laboratory and field visits	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours per week / 1.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Naeem S. Hammadi	Email: naeem.hammadi@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	Graduating students who are able to: - Understand the biological and ecological foundations of the oceans. - Identify the diversity and importance of marine life. - Study marine ecosystems and interactions among marine organisms. - Analyze threats to marine life and ways to conserve them. - Develop research and observation skills in marine biology.
9. Teaching and Learning Strategies	

Strategy	• Practical lectures in the laboratory and field visits. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Students will be able to identify marine biology	Visit to the marine biology laboratory.	• Theoretical lecture • Presentation • discussion	the exams Daily and monthly And final reports Daily
Second	3 hours	Students will be able to conduct a case study of a local marine ecosystem.	Case study of a local marine ecosystem.	• Theoretical lecture • Presentation • discussion	the exams Daily and monthly And final reports Daily
Third	3 hours	Students will be able to collect samples of marine organisms.	Methods of collecting samples from marine organisms	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Fourth	3 hours	Students will be able to use a microscope to study marine plankton.	Using a microscope to study marine plankton	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Fifth	3 hours	Students will be able to classify some algae and seaweeds.	Methods of classifying some algae and seaweeds	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Sixth	3 hours	Students will be able to identify ways of classifying some marine zooplankton.	Methods of classifying some marine zooplankton	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Seventh	3 hours	None	First Monthly Exam	None	None
Eighth	3 hours	Students will be able to identify the classification methods of some marine crustaceans and cnidarians.	Methods of classification of some marine crustaceans and cnidarians	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Ninth	3 hours	Students will be able to identify the classification of sponges and marine mollusks.	Methods of classifying sponges and marine mollusks	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions

Tenth	3 hours	Students will be able to identify the classification of some marine echinoderms.	Methods of classification of some marine echinoderms	• Theoretical lecture • Presentation • Group discussion • Video	he exams Daily and monthly And final reports Daily
Eleventh	3 hours	Students will be able to identify the classification of some seabirds.	Methods of classifying seabirds	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Twelfth	3 hours	Students will be able to identify ways of classifying some marine reptiles.	Methods of classifying marine reptiles	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Thirteenth	3 hours	Students will be able to identify the classification of some marine mammals.	Methods of classifying marine mammals	• Theoretical lecture • Presentation • Group discussion • Video	the exams Daily and monthly And final reports Daily
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
5 marks for the first monthly exam
5 marks for the second monthly exam
20 marks for the final exam
40 marks total
60 marks for the theoretical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	None

Main References (Sources)	- Miller, S. L., & Harley, J. P. (2017). Biology of the Marine Environment. 4th ed. New York: McGraw-Hill Education. - Castro, P. & Huber, M. (2016). Marine Biology. 9th ed. New York: McGraw-Hill Education. - Koehl, M. A. R. (2016). Marine Biology: An Ecological Approach. 2nd ed. New York: Pearson. - Birkhead, T. R., & Møller, A. P. (2018). Marine Biology: A Very Short Introduction. Oxford:
Recommended Books and References (Scientific Journals, Reports...)	- Hickman, J. R., & McLean, J. (2015). Marine Biology: A Comprehensive Overview. 2nd ed. New York: Wiley-Blackwell. - Budd, G. E., & Telford, M. J. (2009). The Origin and Evolution of the Marine Environment. Cambridge: Cambridge University Press. - Baker, A. C. (2003). Coral Reefs: A Very Short Introduction. Oxford: Oxford University Press. - Bennett, W. A., & McCarthy, J. (2019). Marine Biology: An Introduction to Marine Science. 3rd ed. Boston: Cengage Learning.
Electronic References, Websites	- https://www.marinebio.org/ - https://www.mba.ac.uk/ - https://www.fisheries.noaa.gov/ - https://oceanconservancy.org/ - https://seagrant.noaa.gov/ - https://www.mcsuk.org/ - https://www.theoceanagency.org/

Theoretical Course Description

1. Course Name:	
Planktology / Theoretical	
2. Course Code:	
PHYT415	
3. Semester / Year:	
First Semester / 2024-2025	
4. Description Preparation Date:	
25/ 02/ 2025	
5. Available Attendance Forms:	
Attendance in classrooms	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours per week / 2 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Dr. Naeem S. Hammadi	Email: naeem.hammadi@uobasrah.edu.iq
8. Course Objectives	
Course Objectives	• Graduating students capable of: • Working in the field of environmental sciences, they have theoretical and applied knowledge regarding the subject of plankton science. • Obtaining the skills required for the post-graduation plan (postgraduate studies). • Applying for external tests by local/regional/international bodies. • Thinking and analysis skills that enable one to achieve knowledge of diagnosing and classifying wandering species and studying their distribution, density and relationship to the aquatic environment. • Providing students with skills to work in scientific and research laboratories and study plankton science and its relationship to fish resources.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures in classrooms. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	2 hours	Introducing students to general information about plankton science.	A general introduction to plankton science	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	2 hours	Introducing students to phytoplankton and their main divisions.	Phytoplankton and their main divisions.	• Theoretical lecture • Presentation • discussion	he exams Daily and monthly And final reports Daily
Third	2 hours	Explain and clarify the environmental factors affecting phytoplankton.	Environmental factors affecting phytoplankton.	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	2 hours	Introducing students to the group of blue-green algae.	Blue-green algae group.	• Theoretical lecture • Presentation • Group discussion Video presentations	he exams Daily and monthly And final reports Daily
Fifth	2 hours	Explain the general characteristics of the green algae group.	Green algae group.	• Theoretical lecture • Presentation • Group discussion Video presentations	Discussion and oral questions
Sixth	2 hours	Introducing students to the group of diatoms.	group of diatoms.	• Theoretical lecture • Presentation • Group discussion Video presentations	the exams Daily and monthly And final reports Daily
Seventh	2 hours	None	First Monthly Exam	None	None
Eighth	2 hours	Explaining and clarifying primary productivity and its importance to	Primary productivity and its importance to the aquatic ecosystem.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Ninth	2 hours	A detailed explanation of zooplankton and their main divisions.	Introduction to zooplankton and their main divisions.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions

Tenth	2 hours	Introducing the importance of the relationship between phytoplankton	The relationship between phytoplankton and zooplankton.	• Theoretical lecture • Presentation • Group discussion Video	he exams Daily and monthly And final reports Daily
Eleventh	2 hours	Explanation and clarification of the group of Rotifera and Copepoda.	Set of Rotifera and Copepoda.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Twelfth	2 hours	Introduction to the groups of ciliates and Cladocera.	groups of ciliates and Cladocera.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Thirteenth	2 hours	A detailed explanation of the importance of secondary productivity of zooplankton.	The importance of secondary productivity of zooplankton.	• Theoretical lecture • Presentation • Group discussion Video	Discussion and oral questions
Fourteenth	2 hours	None	Second Monthly Exam	None	None
Fifteenth	2 hours	None	General Review	• Group discussion • Answering students' questions	None

11. Course Evaluation

Distribution of 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.
5 marks for attendance, participation and answering oral questions
5 marks for reports and projects
10 marks for the first monthly exam
10 marks for the second monthly exam
30 marks for the final exam
Total 60 marks
40 marks for the practical part

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	Al-Mayah, Abdul-Ridha Akbar and Al-Hameem, Ferial Hameem 1991. Aquatic Plants and Algae. Dar Al-Hikma Press, University of Basrah, 735 pages.

Main References (Sources)	Smith, G. M. 1950. The freshwater algae of the United States. 2nd ed. Mc Graw-Hill Book Co., New York, 719pp Fernando, C. H. 2002. A guide to tropical freshwater zooplankton, identification, ecology and impact on fisheries. Backhuys Publishers, Leiden. 291pp.
Recommended Books and References (Scientific Journals,	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering, Narendra Publishing House, New Delhi.
Electronic References, Websites	https://oceanservice.noaa.gov/facts/plankton.html https://education.nationalgeographic.org/resource/plankton/ https://www.britannica.com/science/plankton https://australian.museum/learn/animals/plankton/what-is-plankton/ https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/plankton

Practical Course Description

1. Course Name:
Planktology / Practical
2. Course Code:
PHYT415
3. Semester / Year:
First Semester / 2024-2025
4. Description Preparation Date:
25/ 02/ 2025
5. Available Attendance Forms:
Attendance in the laboratory and field visits
6. Number of Credit Hours (Total) / Number of Units (Total)

3 hours per week / 1.5 units
7. Course Administrator's Name (Mention All, If More Than One Name)
Name: Dr. Naeem S. Hammadi Email: naeem.hammadi@uobasrah.edu.iq
8. Course Objectives

Course Objectives	• Graduating students capable of: • Working in the field of environmental sciences, they have theoretical and applied knowledge regarding the subject of plankton science. • Obtaining the skills required for the post-graduation plan (postgraduate studies). • Applying for external tests by local/regional/international bodies. • Thinking and analysis skills that enable one to achieve knowledge of diagnosing and classifying wandering species and studying their distribution, density and relationship to the aquatic environment. • Providing students with skills to work in scientific and research laboratories and study plankton science and its relationship to fish resources.

9. Teaching and Learning Strategies	
Strategy	• Practical lectures in the laboratory and field visits. • Presentations and video materials. • Group discussions. • Problem-based learning, inquiry and brainstorming. • Report and project-based learning.

10. Course Structure

Week	Hours	Required learning	Unit or Subject Name	Learning Method	Evaluation Method
First	3 hours	Introducing students to general information about plankton science.	A general introduction to plankton science	• Theoretical lecture • Presentation • discussion	Discussion and oral questions
Second	3 hours	Introducing students to phytoplankton and their main divisions.	Phytoplankton and their main divisions.	• Theoretical lecture • Presentation • discussion	he exams Daily and monthly And final reports Daily

Third	3 hours	Explain and clarify the environmental factors affecting phytoplankton.	Environmental factors affecting phytoplankton.	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Fourth	3 hours	Introducing students to the group of blue-green algae.	Blue-green algae group.	• Theoretical lecture • Presentation • Group discussion • Video presentations	he exams Daily and monthly And final reports Daily
Fifth	3 hours	Explain the general characteristics of the green algae group.	Green algae group.	• Theoretical lecture • Presentation • Group discussion • Video presentations	Discussion and oral questions
Sixth	3 hours	Introducing students to the group of diatoms.	group of diatoms.	• Theoretical lecture • Presentation • Group discussion • Video presentations	the exams Daily and monthly And final reports Daily
Seventh	3 hours	None	First Monthly Exam	None	None
Eighth	3 hours	Explaining and clarifying primary productivity and its importance to the aquatic ecosystem and methods	Primary productivity and its importance to the aquatic ecosystem.	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions

Ninth	3 hours	A detailed explanation of zooplankton and their main divisions.	Introduction to zooplankton and their main divisions.	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Tenth	3 hours	Introducing the importance of the relationship between phytoplankton and zoplankton.	The relationship between phytoplankton and zooplankton.	• Theoretical lecture • Presentation • Group discussion • Video	he exams Daily and monthly And final reports Daily
Eleventh	3 hours	Explanation and clarification of the group of Rotifera and Copepoda.	Set of Rotifera and Copepoda.	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Twelfth	3 hours	Introduction to the groups of ciliates and Cladocera.	groups of ciliates and Cladocera.	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Thirteenth	3 hours	A detailed explanation of the importance of secondary productivity of zooplankton.	The importance of secondary productivity of zooplankton.	• Theoretical lecture • Presentation • Group discussion • Video	Discussion and oral questions
Fourteenth	3 hours	None	Second monthly exam	None	None
Fifteenth	3 hours	None	General review	• Group discussion • Answering students' inquiries	None

11. Course Evaluation

Distribution of 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. 5 marks for attendance, participation and answering oral questions 5 marks for reports and projects 5 marks for the first monthly exam 5 marks for the second monthly exam 20 marks for the final exam 40 marks total 60 marks for the theoretical part

12. Learning and Teaching Sources	
Required Textbooks (Curricular Books, If Any)	Al-Mayah, Abdul-Ridha Akbar and Al-Hameem, Ferial Hameem 1991. Aquatic Plants and Algae. Dar Al-Hikma Press, University of Basrah, 735 pages.
Main References (Sources)	Smith, G. M. 1950. The freshwater algae of the United States. 2nd ed. Mc Graw-Hill Book Co., New York, 719pp Fernando, C. H. 2002. A guide to tropical freshwater zooplankton, identification, ecology and impact on fisheries. Backhuys Publishers, Leiden. 291pp.
Recommended Books and References (Scientific Journals,	Misra R. and Dora K.C. 2015. A text Book on Aquaculture Engineering, Narendra Publishing House, New Delhi.
Electronic References, Websites	https://oceanservice.noaa.gov/facts/plankton.html https://education.nationalgeographic.org/resource/plankton/ https://www.britannica.com/science/plankton https://australian.museum/learn/animals/plankton/what-is-plankton/ https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/plankton