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

2026

Introduction:

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

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

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 10/9/2024 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: Al-Muthanna university
Faculty/Institute: college of education for pure sciences
Scientific Department: Biology
Academic or Professional Program Name: Postgraduate
Final Certificate Name: Msc. Biology.
Academic System: semester
Description Preparation Date: 3/2/2026
File Completion Date: 3\2\2026

Signature:
Head of Department Name:
Assist. Prof. Dr. Dhay Ali Azeez
Date:8/2/2026

Signature:
Scientific Associate Name:
Prof. Dr. Arshad N. Hussein
Date:8/2/2026

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Date: 8/2/2026
Signature:

Approval of the Dean

1. Program Vision

The Department of Life Sciences aspires to gain international recognition in the fields of scientific research and teaching by achieving academic quality as well as local recognition in the field of supplying the labor market with highly qualified scientific cadres.

2. Program Mission

.Graduating a student who is able to study in middle and secondary schools

.Graduating a student who is familiar with the basic concepts of life sciences .

.Graduating a student who is familiar with educational methods for dealing with adolescents

.Graduating an elite group of students who have the ability to continue their higher education to support higher education in the future.

3. Program Objectives

1 • To enhance the quality of scientific research in the field of Life Sciences by enabling at least 80% of students to successfully complete graduation projects or research studies that meet approved scientific standards.

- To prepare qualified personnel capable of utilizing modern and advanced technologies in Life Sciences, ensuring that at least 85% of students achieve a proficiency level of no less than 70% in courses and practical applications related to these technologies.
- To prepare graduates qualified for employment in scientific research, teaching, and institutions related to the field of specialization, with at least 70% of graduates obtaining employment or enrolling in postgraduate studies within the first year after graduation.
- To develop researchers capable of contributing to the generation and advancement of scientific knowledge through the participation of at least 75% of students in research activities, scientific seminars, conferences, or scientific projects during their period of study.
- To strengthen scientific communication and teamwork skills by ensuring the participation of all students (100%) in presentations, group activities, or scientific discussion seminars throughout their academic program.

4. Program Accreditation

Does the program have program accreditation? And from which agency?
yes

5. **Other external influences**
Is there a sponsor for the program?
Ministry of Higher Education and Scientific Research.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	3	4	%11.7	3
College Requirements	-	-	-	-
Department Requirements	11	22	%64.7	11
thesis	-	8	%23.5	-
Other				

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

7. Program Description

عدد الساعات الاسبوعية	عدد الوحدات	المادة باللغة الانكليزية	المادة العلمية باللغة العربية	ت
2	2	Adv. Animal Physiology	فسلجة حيوان متقدم	.1
1	1	Adv. Teaching Methods	طرائق تدريس متقدم	.2
1	1	Adv. English Language I	لغة انكليزية متقدم I	.3
3	3	Adv. Microbiology	أحياء مجهرية متقدم	.4

2	2	Adv. Ecology	علم البيئة المتقدم	.5
2	2	Adv. Biochemistry	كيمياء حياتية متقدم	.6
2	2	Adv. Biostatics	احصاء حياتي متقدم	.7
3	3	Adv. Immunology	مناعة متقدم	1
1	1	Adv. English Language I	لغة انكليزية متقدم	2
3	3	Adv. Parasitology	طفيليات متقدم	3
2	2	Adv. Potany	نبات متقدم	4
2	2	Adv. Biotechnology	تقانات أحيائية متقدم	5
1	-	Seminar	حلقات دراسية	6
2	2	Research Methodology	طرق بحث	7

8. Expected learning outcomes of the program

A- Cognitive Objectives

1. Develop cognitive awareness of multidisciplinary issues related to life sciences.
2. Enhance knowledge of the role of innovation and advanced research in developing life sciences and serving society.
3. Deepen knowledge of modern global trends in life sciences and their research, medical, and environmental applications.

B- Program- specific skills objectives

1.Enhance critical and analytical thinking skills in evaluating published scientific studies and research. 2. Develop advanced academic writing skills and prepare scientific theses and research papers according to scientific publishing standards.	1. The correct scientific thinking method. 2. Discussion method. 3. Daily, monthly, and annual tests.
C- Affective and Value – Based objectives	
1. Establishing positive attitudes towards scientific research, innovation and lifelong learning in the field sciences. 2. Promoting positive attitudes towards employing scientific knowledge in the service of society and sustainable development.	1.Through daily and monthly tests. 2. Through discussions. 3. Practical and applied tests. 4. By reviewing the experiences of different universities.
D- General and transferable skills (other skills related to employability and personal development).	
1. Utilizing the acquired information. 2. Personal development through reading and updating knowledge. 3. Engaging in a teaching career. 4. participation in seminars, conferences and workshops Specialized.	

9. Teaching and Learning Strategies

Advanced interactive Lectures

Research – Based learning

Advanced Laboratory– Based learning

Specialized Scientific Seminars and Workshops.

10. Evaluation methods

1. Theoretical tests.
2. Discussions.
3. Final examinations.

1. Faculty

Faculty Members

Academic Rank	Specialization		Requirements (Special Skills, if any applicable)		Faculty preparation	
	General	precise			Staff	Lecturer
Prof. Dr. Taysir Abdul-Ilah Kazim	Life Sciences	Medical Microbiology			✓	
Asst. Prof. Dr. **Dhay Ali Azeez**	Life Sciences	Medical Microbiology			✓	
Prof. Dr. Hassan Hadi Sharom						✓
Prof. Dr.Ali Al-Fanharawi						✓
Prof. Dr.yassir Abdul-Ilah Kadhim	Life Sciences	Medical Microbiology			✓	
Prof. Dr.Mohammed Radwn Mahmoud	Agricultural Sciences	Field Crops				✓
Prof. Dr. Arshad Naji Alhasnawi	Agricultural Sciences	Molecular Genetics			✓	
israa hamdan					✓	
Assist. Pro.dr. Iqbal Awad Kati	Life Sciences	Animal Physiology			✓	

Assist. Pro.dr. Nadia Hussein Ali	Geography	Medical Geography			✓	
Assist. Pro.dr.					✓	
dr. mohamed baqer Hussein	Life Sciences	Plant Taxonomy and Plant Anatomy			✓	

11. Faculty

Faculty Members

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

	✓			احياء مجهرية طبية	علوم حياة	أ.د. تيسير عبد الاله كاظم
	✓			احياء مجهرية طبية	علوم حياة	أ.م.د. ضي علي عزيز
✓				تعليم معاقين		ا.د حسن هادي شروم
✓				علم البيئة	علوم حياة	أ.د. علي عبد الحمزة عبيد
	✓			علم الطفيليات	علوم حياة	أ.د. ياسر دخيل كريمش
✓				محاصيل حقلية	زراعة	أ.د. محمد رضوان محمود
	✓			وراثة جزيئية	زراعة	أ.د أرشد ناجي حسين
	✓			كيمياء عضوية	كيمياء	ا.م. د أسراء عبد الحسن حمدان
✓				تقنيات احيائية	علوم حياة	أ.م.د ضفاف جبار شمران
	✓			جغرافية طبية	جغرافية	ا.م.د نادية حسين علي
	✓			فسلجة حيوان	علوم حياة	أ.م.د أقبال عوض كاطع
	✓			تشريح وتصنيف نبات	علوم حياة	أ.م.د محمد باقر حسين

Professional Development

Mentoring new faculty members

Briefly describes the process used to mentor new, visiting, full-time, and part-time faculty at the institution and department level.
Professional development of faculty members
Briefly describe the academic and professional development plan and arrangements for faculty such as teaching and learning strategies, assessment of learning outcomes, professional development, etc.

12. **Acceptance Criterion**
(According to the regulations of the Ministry of Higher Education and Scientific Research.

13. **The most important sources of information about the program**
1. **Ministry of Higher Education and Scientific Research** 2. **Deans Committee**

14. Program Development Plan
Academic Program Development Plan for Postgraduate Studies in the Department of Life Sciences The academic development plan for the postgraduate program in the Department of Life Sciences is based on achieving a balance between cognitive, psychomotor (skill-based), and affective learning objectives to ensure the preparation of graduates who possess advanced scientific knowledge, research competencies, practical skills, and professional values. The plan is developed according to the courses offered in the first and second semesters and is aligned with the intended learning outcomes of the program. **First Semester Courses**

Advanced Animal Physiology

This course contributes to the cognitive objective by enhancing students' understanding of advanced physiological processes and regulatory mechanisms in living organisms. The psychomotor objective focuses on developing laboratory and experimental skills, including conducting physiological experiments, data collection, and result interpretation. The affective objective promotes scientific integrity, ethical conduct, and commitment to professional standards in research and laboratory work.

Advanced Ecology

The cognitive objective of this course is to provide students with advanced knowledge of ecological systems, biodiversity, and organism–environment interactions. The psychomotor objective involves developing skills in environmental assessment, field research, data analysis, and ecological modeling. The affective objective emphasizes environmental responsibility, sustainability awareness, and commitment to biodiversity conservation.

Advanced Biochemistry

This course aims to deepen students' understanding of biochemical processes, metabolic pathways, and molecular interactions. The psychomotor objective focuses on developing laboratory competencies related to biochemical analysis and modern analytical techniques. The affective objective encourages accuracy, objectivity, and ethical handling of scientific data.

Advanced Microbiology

The cognitive objective is to provide advanced knowledge of microbial diversity, physiology, genetics, and applications in health and environmental sciences. The psychomotor objective includes developing skills in microbial isolation, identification, culturing techniques, and laboratory diagnosis. The affective objective promotes adherence to biosafety regulations and professional responsibility.

Biostatistics

This course provides students with knowledge of statistical concepts and methodologies used in biological research. The psychomotor objective focuses on developing competence in statistical software applications, data analysis, and interpretation of research findings. The affective objective fosters objectivity, precision, and evidence-based decision-making.

Teaching Methods

The cognitive objective is to familiarize students with modern educational theories, teaching strategies, and learning principles. The psychomotor objective develops skills in lesson planning, classroom management, instructional design, and the use of educational technologies. The affective objective encourages positive attitudes toward teaching, lifelong learning, and professional development.

Second Semester Courses

Advanced Biotechnology

This course aims to provide advanced knowledge of biotechnology principles and their applications in medicine, agriculture, and industry. The psychomotor objective focuses on developing practical skills in biotechnology techniques and the use of advanced laboratory equipment. The affective objective promotes appreciation of biotechnology's role in solving societal and environmental challenges.

Advanced Botany

The cognitive objective focuses on advanced understanding of plant structure, physiology, taxonomy, and ecological adaptations. The psychomotor objective includes developing skills in plant identification, laboratory investigations, and application of modern botanical techniques. The affective objective enhances awareness of plant conservation and sustainable management of natural resources.

Advanced Parasitology

This course provides advanced knowledge of parasite biology, taxonomy, life cycles, host-parasite relationships, and disease mechanisms. The psychomotor objective develops diagnostic and research skills related to parasitic infections. The affective

objective encourages commitment to public health and disease prevention.

Advanced Immunology

The cognitive objective is to develop a comprehensive understanding of immune system mechanisms, immune disorders, and modern immunological applications. The psychomotor objective focuses on laboratory skills related to immunological assays and data interpretation. The affective objective promotes ethical responsibility in medical and scientific research.

Research Methodology

This course provides knowledge of scientific research principles, research design, hypothesis formulation, and data interpretation. The psychomotor objective focuses on developing skills in proposal writing, research implementation, scientific writing, and presentation of findings. The affective objective reinforces academic integrity, research ethics, and intellectual honesty.

Seminars

The cognitive objective of seminars is to broaden students' understanding of contemporary scientific issues and recent advances in life sciences. The psychomotor objective develops presentation, communication, critical thinking, and scientific discussion skills. The affective objective promotes self-confidence, teamwork, respect for diverse viewpoints, and professional engagement.

Program Development Strategy

To ensure continuous improvement, the postgraduate program will undergo regular curriculum review and updating to reflect recent scientific advancements. Laboratory facilities will be enhanced through the acquisition of modern equipment and technologies. Digital learning resources, bioinformatics tools, and scientific databases will be integrated into teaching and research activities. Faculty development programs will be implemented to strengthen teaching effectiveness, assessment methods, and research supervision.

The program will also encourage scientific research, publication in high-impact

journals, participation in scientific conferences, and collaboration with national and international academic and research institutions. Assessment methods will be continuously improved to effectively measure cognitive, psychomotor, and affective learning outcomes through examinations, laboratory assessments, research projects, presentations, and student feedback.

Timeline for Program Development

Year One

- Review and update course syllabi and learning outcomes.
- Align courses with national and international quality standards.
- Introduce modern teaching and assessment strategies.

Year Two

- Upgrade laboratories and research facilities.
- Expand the use of digital learning platforms and scientific databases.
- Provide professional development workshops for academic staff.

Year Three

- Evaluate program learning outcomes and key performance indicators.
- Assess student satisfaction and stakeholder feedback.
- Implement corrective actions and prepare for academic accreditation and quality assurance reviews.

Through this development plan, the postgraduate program in the Department of Life Sciences seeks to achieve excellence in teaching, research, and community service while producing highly qualified graduates capable of contributing effectively to scientific advancement and sustainable development.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A 1	A2	A 3	A 4	B 1	B 2	B 3	B4	C1	C2	C3	C4
2025-2026		Adv. Animal Physiology		√	√	√	√	√	√	√	√	√	√	√	√
		Adv. Teaching Methods		√	√	√	√	√	√	√	√	√	√	√	√
2025-2026		Adv. English Language I		√	√	√	√	√	√	√	√	√	√	√	√
		Adv. Microbiology		√	√	√	√	√	√	√	√	√	√	√	√
2025-2026		Adv. Ecology		√	√	√	√	√	√	√	√	√	√	√	√
		Adv. Biochemistry		√	√	√	√	√	√	√	√	√	√	√	√
2025-2026		Adv. Biostatics		√	√	√	√	√	√	√	√	√	√	√	√
		Adv. Immunology		√	√	√	√	√	√	√	√	√	√	√	√
2025-2026		Adv. English Language I		√	√	√	√	√	√	√	√	√	√	√	√
2025-2026		Adv. Parasitology		√	√	√	√	√	√	√	√	√	√	√	√
2025-2026		Adv. Potany													

2025-2026		**Adv. Biotechnology**													
2025-2026		**Seminar**													
2025-2026		**Research Methodology**													

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

Course Description Form

1. Course Name:
Microbiology
2. Course Code:
3. Semester / Year: Master's course
2024-2025
4. Description Preparation Date:10 /9/2025
2025-2026
5. Available Attendance Forms
: Daily attendance
6. Number of Credit Hours (Total) / Number of Units (Total):
3 h. (theoretical)
7. Course administrator's name (mention all, if more than one name)
Name: lecturer Dhay Ali Azeez Email: Dhayali_1985@mu.edu.iq
8. Course Objectives

Course Objectives	• Identify microorganisms and methods of controlling them • Identify the history of microorganisms, their origins, and the position of bacteria among other organisms.

	• Identify the body's immunity and resistance to diseases • Identify the types of Gram-positive and Gram-negative bacteria. • Identify viruses, their structure, and classification. • Identify fungi, their structure, ways of life, and reproduction

9. Teaching and Learning Strategies

Strategy	Education strategy collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-15	3	knowledge	**1.Introduction of microbiology** **2. Bacteria Compared with Other Microorganisms** **3.general charactertion and classificatio bacteria** **4. Structure of Bacterial Cells** **5. Growth** **6. Genetics** **. Classification of Medically Important Bacteria (gram positive bactreia)** **8. gram negative bacteria** **9. Normal Flora** **10. Pathogenesis** **11. Host Defenses** **12. Laboratory Diagnosis**	A student who knows how to handle dangerous and toxic chemicals He also knows the correct handling method in the laboratory He is good at explaining chemistry and linking it to biology, as he is a life sciences teacher In addition to the skill of chemical calculations	Weekly, monthly, daily, written exams, and the end-of-year exam.

			13. Antimicrobial Drugs: **14.Mechanism of Action** **15. Antimicrobial Drugs: Resistance**	We teach organic reactions and their benefits in daily life	

11. Course Evaluation
The distribution is as follows: Mid exam is 25%, the seminar and quiz is 5%, and the final exam is 70%,

Course Description Form

Course Name: biostatistics
Course Code:
Semester / Year:
Description Preparation Date: 10/9/2025
2025-2026
Available Attendance Forms: In person
Number of Credit Hours (Total) / Number of Units (Total)
Number of Credit Hours (Total) 60 hours
Course administrator's name (mention all, if more than one name)

Name: D.Mohammed Radwn Mahmoud e: modrn@mu.edu.iq

Course Objectives

Course Objectives	**1- Identify the concept of inferential and inferential statistics.** **2- Identify the null and alternative statistical hypotheses and how to verify them.** **3- Identify the differences between statistics.** **4- Enabling students to be able to interpret statistical results.** **5- Enabling students to be able to distinguish between how to use nonparametric statistics.** **6- Enabling students to apply statistical methods appropriately in light of each topic.**

Teaching and Learning Strategies

ıtegy	**Strategic teaching and learning methods** **Audio methods (teaching explanation of the topic)** **Style of writing on the blackboard** **The method of direct dialogue between the teacher and the student, with the student's evaluation in class participation** **Conduct experiments.**

Course Structure

Week	Hours	SEMISTER 1	SEMISTER 2	Learning method	Evaluation method
The first week	**2Theoretical .**	**To know and distinguish between the population and the sample and employ sampling methods when selecting the sample**	**Introduction to statistics**		**Exams , reports, discussions Quizzes**
second week	**2Theoretical .**	**Data tab**	**Population and sample/methods for selecting samples/parameters and estimates/sample errors**		**Exams , reports, discussions**
the third week	**2Theoretical .**	**Arithmetic mean -**	**Measures of central tendency 1**		**Exams , reports, discussions**
fourth week	**2Theoretical .**	**The mediator - Manwal**	**Measures of central tendency 2**		**Exams , reports, discussions**
The fifth week	**2Theoretical .**	**Variance – Standard Deviation Range – Mean Deviation**	**Data tab - tabular display**		**Exams , reports, discussions**
the sixth week	**2Theoretical .**	**Standard error - coefficient of variation**	**• Frequency distribution table.**		**Exams , reports, discussions**
Seventh week	**2Theoretical .**	**To employ statistical hypotheses in research**	**• Tabular display of metadata.**		**Exams , reports, discussions**
The eighth week	**2Theoretical .**	**To reduce the possibility of the researcher making an error when testing the hypotheses, type 1**	**• Frequency distribution table for quantitative data.**		

		alpha error and type 2 beta error			
Week nine	**2Theoretical .**	**To employ the level of significance / degrees of freedom / examples using the statistical package**	**• Ascending and descending clustered frequency table.**		**Exams , reports, discussions**
The tenth week	**2Theoretical .**	**To know the inferential statistics of the monthly test**	**Measures of dispersion1**		**Exams , reports, discussions**
Week eleven	**2Theoretical .**	**To employ statistical hypotheses in research**	**Measures of dispersion2**		**Exams , reports, discussions**
The twelfth week	**2Theoretical .**	**z test**	**Measures of dispersion3**		**Exams , reports, discussions**
The thirteenth week	**2Theoretical .**	**T test**	**Monthly test**		**Exams , reports, discussions**
The fourteenth week	**2Theoretical .**	**F test**	**Statistical hypotheses/what are statistical hypotheses/null and alternative hypotheses**		**Exams , reports, discussions**
The fifteenth week		**Monthly exams**	**The chances of the researcher making an error when testing hypotheses/type 1 alpha error/type 2 beta error**		
Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc					
Learning and Teaching Resources					

quired textbooks (curricular books, if any)	**Introduction to Statistics by Dr. Khashia Al-Rawi, University of Mosul 2000 - Principles of Statistics by Dr. Khashia Al-Rawi - Naim Thatmi Al-Muhammad - Muayyad Ahmed Al-Younes - Zulayd Khaled Al-Marai**
Main references (sources)	From methodological books, help books, the Internet, and scientific research
Recommended books and references (scientific journals, reports…)	Iraqi Scientific journals in basic specializations
Electronic References, Websites	Al-Muthanna University e-learning website https://agr.mu.edu.iq/

Course Description Form

1. Course Name:
Advances Animal physiology
2. Course Code:
Bio
3. Semester / Year:
2025-2026
4. Description Preparation Date:

2025−2026
5. Available Attendance Forms
: Daily attendance
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Eqbal Awadh Gatea Email: eq_bio2013@mu.edu.iq
8. Course Objectives

Course Objectives	• Introduce students to the science of physiology and its importance. • Study the physiology of different body systems and their mechanisms. • Understand the interrelationship between body systems. • Explore functional and physiological adaptations that help organisms survive
9. Teaching and Learning Strategies	
Strategy	- Lecture with blackboard and oral presentation -Demonstration using diagrams, educational images, data show, and videos -Exploratory lecture-based learning -Interactive discussion -Practical lab-based exercises and tests -E-learning through platforms such as Google Classroom

10. Course Structure					
Week					
1	**2**	knowledge	Introduction to Animal	Interactive	Short questions / class participation

			Physiology	lecture, discussion	
2	**2**	knowledge	Cell Physiology	Lecture, demonstration	Short quiz / practical observation
3	**2**	knowledge	Membrane Transport Mechanisms	Lecture, demonstration	Short quiz / short exercise
4	**2**	knowledge	Nervous System and Action Potentials	Lecture, diagrams, video	Short quiz / class participation
5	**2**	knowledge	Muscle Physiology	Lecture, demonstration	Short quiz / practical exercise
6	**2**	knowledge	Cardiovascular Physiology	Lecture, diagrams, video	Short quiz / class participation
7	**2**	knowledge	Respiratory Physiology	Lecture, demonstration, video	Short quiz / class participation
8	**2**	knowledge	Digestive Physiology	Lecture, diagrams, demonstration	Short quiz / class participation
9	**2**	knowledge	Endocrine Physiology	Lecture, discussion	Short quiz / short exercise
10	**2**	knowledge	Renal Physiology	Lecture, demonstration	Short quiz / short exercise
11	**2**	knowledge	Reproductive Physiology	Lecture, diagrams, demonstration	Short quiz / short exercise
12	**2**	knowledge	Thermoregulation and Homeostasis	Lecture, case discussion	Short quiz / class participation
13	**2**	knowledge	Endocrine Glands and Hormones	Lecture, discussion	Short report / class participation

14	**2**	knowledge	Seminars and Discussions	Lecture, interactive discussion	Short questions / class participation
15	**2**	knowledge	Monthly Exam	-	-

11. Course Evaluation

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

30 marks (25 marks for the monthly exam + 5 seminar)
70 marks (final theoretical exam)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	General Basics in Physiology Dr. Rushdi Fattouh Animal Physiology Dr. Youssef Mohamed Arab and others
Main references (sources)	Guyton and Hall Textbook of Medical Physiology **Principles of Animal Physiology** — Michael G. Hadley
Recommended books and references (scientific journals, reports…)	• **Animal Anatomy and Physiology** • *Journal of Experimental Biology* • *Comparative Biochemistry and Physiology* • *American Journal of Physiology* • *Nature Reviews Physiology*
Electronic References, Websites	• **Google Scholar** – https://scholar.google.com • **ResearchGate** – https://www.researchgate.net • **PubMed** – https://pubmed.ncbi.nlm.nih.gov

	• **SAGE Research Methods** – https://methods.sagepub.com

Course Description Form

13. Course Name:
Biotechnology
14. Course Code:
15. Semester / Year:
2025−2026
16. Description Preparation Date:
2025−2026
17.Available Attendance Forms
: Daily attendance
18.Number of Credit Hours (Total) / Number of Units (Total):
2 hours (theoretical)
19. Course administrator's name (mention all, if more than one name)
Name**: Assist. Prof. Dhifaf Jabbar Shamran** Email: dhifaf15@mu.edu.iq

20. Course Objectives	
Course Objectives	Introducing the student to biotechnology and its importance. The biotechnology is concerned with studying the latest and common technics and assays that used in biology to describe and identify the diseases and it causes. This knowledge will help students in their study and in building a basic information to establish a career in the future.
21. Teaching and Learning Strategies	
Strategy	1- Lecture, use of the blackboard, and delivery 2- Demonstration (using diagrams and educational pictures using datashows, videos) 3- Teaching through exploratory lecture 4- Interactive discussion 5- E-learning using Google Classroom platforms

22. Course Structure

Week					
1	2	knowledge	History of biotechnology, stage of development, DNA and RNA structures	Lecture, use of the blackboard, and delivery , Demonstration (using diagrams and educational pictures using datashows, videos), Teaching through exploratory lecture, Interactive	Theoretical, practical/oral and written examinations

				discussion, E-learning using Google Classroom platforms	
2	**2**	knowledge	Central dogma (DNA replication, RNA transcription, translation), regulation of gene expression	====	====
3	**2**	knowledge	The methods of nuclear acids extractions from different sources and its importance	====	====
4	**2**	knowledge	Gel electrophoresis and its applications	====	====
5	**2**	knowledge	PCR assay it principles, stages and applications	====	====
6	**2**	knowledge	Introduction for Genetic engineering, restriction enzymes	====	====
7	**2**	knowledge	Vectors for genetic engineering	====	====
8	**2**	knowledge	**Midterm exam**	====	====
9	**2**	knowledge	ELISA and Vitec assay its principles and applications	====	====
10	**2**	knowledge	Methods for reading DNA sequencing	====	====
11	**2**	knowledge	Bioinformatic and its	====	====

			application		
12	**2**	knowledge	The production of biofuel	====	====
13	**2**	knowledge	Microbial growth and bioreactors	====	====
14	**2**	knowledge	Introduction for NANO-technology, the production and applications	====	====
15	**2**	knowledge	Animal tissue culture, cell lines	====	====

23. Course Evaluation

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

25 marks for midterm exam + 5 marks for seminar
70 marks for final theoretical exam

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	An Introduction to Biotechnology The science, technology and medical applications W. T. Godbey Tulane University New Orleans, Louisiana
Recommended books and references (scientific journals, reports…)	Cell biology : a short course / Stephen R. Bolsover . . . [et al.].—2nd ed.
Electronic References, Websites	Websites available on internet

Course Description Form

1. Course Name:
Adv. Ecology
2. Course Code:
3. Semester / first semester
First--- 2025-2026
4. Description Preparation Date:
2025-2026
5. Available Attendance Forms
: week attendance
6. Number of Credit Hours (Total) / Number of Units (Total):
2 hours (theoretical) 2 hours(practical)
7. Course administrator's name (mention all, if more than one name)
Name: lecturer Ali Al-Fanharawi Email: alialfanharawi@mu.edu.iq
8. Course Objectives

Course Objectives	1- Analysis the ecological problems. Teaching students about laboratory work and dealing with tools and chemicals 2- Teaching students the principle process 3- Providing students with the skill of scientific research into cause and effect

	4- Teaching students energy flow and nutrients cycle.
9. Teaching and Learning Strategies	
Strategy	Education strategy collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**2**	knowledge	-**Environmental Problems, Their Causes, and Sustainability.** **-Pollution, and What Can We Do about It?** **-Scientific Principles of Sustainability.** **-Energy and How Can It Be Changed.** **-Ecosystems: What Are They**	Analysis methods Problems detection Make a decision	Weekly, monthly, daily, written exams, and the end-of-year exam.

			and How Do They Work. **-Biodiversity, Species Interactions, and Population Control.** **How Do Species Interact?** **-Natural Selection Reduce Competition between Species.** **-Limitation of the Growth of Populations.** **-Human Population and Its Impact.** **How Many People Can the Earth Support?** **-Factors Influence the Size of the Human Population.** **-Population's Age Structure.** **-People and the Earth Support.**		

11. Course Evaluation	
The distribution is as follows: the first mid exam is 25%, activities 5% and final exam is 70%,	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	G. Tyler Miller, Jr. and Scott E. Spoolman. 2009. Essentials of Ecology.

Recommended books and references (scientific journals, reports...)	--
Electronic References, Websites	Websites available on Google Chrome

Course Description Form

1. Course Name:
Biochemistry
2. Course Code:
3. Semester / Year: Master's course
2025-2026
4. Description Preparation Date:10 /9/2025
2025-2026
5. Available Attendance Forms
: Daily attendance

6. Number of Credit Hours (Total) / Number of Units (Total):	
2 h. (theoretical)	
7. Course administrator's name (mention all, if more than one name)	
Name: lecturer israa hamdan Email: israa.hamdan@mu.edu.iq	
8. Course Objectives	
Course Objectives	1- Teaching students about laboratory work and dealing with tools and chemicals 2- Teaching students to prepare solutions and perform chemical calculations 3- Providing students with the skill of scientific research into cause and effect 4- Teaching students some organic reactions
9. Teaching and Learning Strategies	
Strategy	Education strategy collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2**	knowledge	Carbohydrates, introduction, its prevalence and importance of studying it Properties, classification, monosaccharides Disaccharides, polysaccharides, starches Glycogen, dextrins Cellulose, amino sugars Fats, classification, properties, neutral lipids, phospholipids Sphingomyelin, glycolipids, cerebrosides Waxes, steroids, terpenes Proteins, their importance, existence, general properties, classification Amino acids (essential and non-essential), non-protein amino acids, properties of amino acids and zwitterionic composition. Primary structure of protein, Secondary structure of protein, Tertiary structure of protein Methods of protein purification, Methods of protein quantification,	A student who knows how to handle dangerous and toxic chemicals He also knows the correct handling method in the laboratory He is good at explaining chemistry and linking it to biology, as he is a life sciences teacher In addition to the skill of chemical calculations We teach organic reactions and their benefits in daily life	Weekly, monthly, daily, written exams, and the end-of-year exam.

			Methods of protein molecular weight estimation Types of peptides, Physiologically active peptides, Identification of amino acids at the ends of the peptide chain Enzymes, Structure, Importance, Classification, Nomenclature of enzymes Kinetic properties of enzymes, Mechanism of action of regulatory enzymes (allostery) Isotypic enzymes, Enzyme activators and inhibitors Exam		

11. Course Evaluation	
The distribution is as follows: the first semester exam is 5%, the second semester is 5%, and the half year is 15%, the first semester practical exam is 5%, and the second semester practical exam is 5%, in addition to absences 3%.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, any)	

Course Description Form

25. Course Name:
ADV. Research Methodology

26. Course Code:	
27. Semester / Year:	
2025-2026	
28. Description Preparation Date:10 /9/2025	
2025-2026	
29.Available Attendance Forms	
: Daily attendance	
30.Number of Credit Hours (Total) / Number of Units (Total):	
2 hours (theoretical)	
31. Course administrator's name (mention all, if more than one name)	
Name: lecturer.dr. mohamed baqer Hussein Email: .::Mohamed-almosawy@mu.edu.iq	
32. Course Objectives	
Course Objectives	This course aims to equip postgraduate students with the theoretical knowledge and practical skills required to understand scientific research methodology, enabling them to design, conduct, and write academic research and theses in accordance with recognized academic and ethical standards.
33. Teaching and Learning Strategies	
Strategy	1- Lecture, use of the blackboard and presentation 2- Demonstration (using graphs, pictures and educational films using a data projector) 3- Interactive discussion

	4- Self-education

34. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**2**	knowledge	**Introduction to Scientific Research** **Definition of scientific research, its characteristics, types, and importance in postgraduate studies.**	-Lecture, use of the blackboard and presentation -Demonstration (using graphs, pictures and educational films using a data projector) -Interactive discussion -Self-education - Open educational classes using the Classroom platform	Theoretical, practical/oral and written examinations (daily, monthly and midterm exam) and scientific reports
2	**2**	knowledge	**Research Ethics** **Academic integrity, plagiarism, citation, and ethical responsibility of the researcher.**	**====**	**====**
3	**2**	knowledge	**Selecting the Research Problem** **Sources of research problems, criteria for selection, and scientific formulation.**	**====**	**====**
4	**2**	knowledge	**Research Title and Objectives** **Characteristics of a good title, general and specific objectives.**	**====**	**====**
5	**2**	knowledge	**Research Hypotheses and Questions** **Definition, types, and formulation of research hypotheses.**	**====**	**====**

6	**2**	knowledge	**Literature Review** **Importance, sources, and methods of analyzing literature.**	**====**	**====**
7	**2**	knowledge	**Theoretical Framework and Previous Studies** **Building the theoretical framework and linking it to previous studies.**	**====**	**====**
8	**2**	knowledge	**Research Methodologies** **Descriptive, experimental, historical, and analytical methods.**	**====**	**====**
9	**2**	knowledge	**Population and Sample** **Research population, types of samples, and sampling techniques.**	**====**	**====**
10	**2**	knowledge	Data Collection Tools Questionnaires, interviews, observation, and tests.	**====**	**====**
11	**2**	knowledge	**Validity and Reliability** **Concepts of validity and reliability and methods of verification.**	**====**	**====**
12	**2**	knowledge	**Statistical Methods** **Descriptive and inferential statistics and their applications.**	**====**	**====**
13	**2**	knowledge	**Data Analysis and Discussion** **Analyzing results and relating them to literature.**	**====**	**====**
14	**2**	knowledge	**Thesis Writing** **Structure of a thesis, academic language, and formatting.**	**====**	**====**
15	**2**	knowledge	**Referencing and Citation** **Scientific referencing styles**	**====**	**====**

			such as APA and IEEE.		

35. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc 40 marks (5 marks for the first monthly exam + 5 marks for the second monthly exam + 15 marks for the midterm exam) + 5 marks for daily preparation and daily tests) 60 marks (40 marks final theoretical exam)

36. Learning and Teaching Resources	
Required textbooks (curricular books, if ar	not available
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Towards the development of school administration ((theoretical and field studies), Psychology of school administration.
Electronic References, Websites	Websites available on Google Chrome

Course Description Form

37. Course Name:
Advance Parasitology
38. Course Code:
Postgraduate studies

39. Semester /Second semester	
2025-2026	
40. Description Preparation Date:10 /9/2025	
2025-2026	
41.Available Attendance Forms	
: Daily attendance	
42.Number of Credit Hours (Total) / Number of Units (Total):	
3hours (theoretical) / 3 units	
43. Course administrator's name (mention all, if more than one name)	
Name: Pro.dr. yassir dakheel kremsh alasadiy Email: dr.yassiralasadiy@mu.edu.iq	
44. Course Objectives	
Course Objectives	Give a general idea of parasites with clarifying the relationship of these organisms with other organisms from where be affected and effect and what are the most important diseases caused by these organisms
45. Teaching and Learning Strategies	
Strategy	1- Lecture, use of the blackboard and presentation 2- Demonstration (using graphs, pictures and educational films using a data projector) 3- Interactive discussion 4- Self-education

46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	knowledge	**Introduction of advance parasitology Public relations between animals Advantages of parasitism A - The benefits that parasites gain from their hosts - The harms that parasites gain from their hosts**	-Lecture, use of the blackboard and presentation -Demonstration (using graphs, pictures and educational films using a data projector) -Interactive discussion -Self-education - Open educational classes using the Classroom platform	Theoretical, practical/oral and written examinations (daily, monthly and midterm exam) and scientific reports
2	3	knowledge	**types of parasitism, types of parasites and hosts Parasitism in the animal kingdom, infectious stages, sources of infection**	**====**	**====**
3	3	knowledge	**Entrances and exits of infection, factors affecting the spread and density of parasites, and the stages that the parasite goes through Phylum: protozoa , characteristics and manifestations of the phylum (characteristics of the Phylum: protozoa, body composition) Life aspects of the Division (nutrition, movement, respiration, secretion, reproduction, secretion, growth, response to stimuli, ticking, classification of**	**====**	**====**

			protozoa)		
4	3	knowledge	Class: Sarcodina 1-Entamoeba histolytica 2-Entamoeba coli 3-Endolimax nana 4-Iodomoeba butschlii 5- Dientamoeba fragilis 6-Entamoeba gingivalis free living amoeba [Naegleria fowleri] [Acanthamoeba spp.]	====	====
5	3	knowledge	Class: Mastigophora 1- Giardia intestinalis 2-Chiomastix mesnili 3-Trichomonas vaginalis 4-T.tenax 5-T. hominis 6-T. foetus	====	====
6	3	knowledge	Blood and tissue Mastigophora 2- Leishmania tropica 1- L.donovani 2- Trypanosoma gambianse T. cruzi Class: sporozoa Plasmodium vivax ,P. ovale ,P. malarae, P. falciparum)	====	====
7	3	knowledge	Topxoplasma gondii Class: Ciliophora Blantidium coli	====	====
8	3	knowledge	All parasites mentioned above are studied in the form and composition of the parasite, life	====	====

			cycle, pathology, epidemiology, diagnosis, prevention **Phylum: Platyhelminthes** **Characteristics of the Division of flatworms, body wall installation, gastrointestinal tract, urinary system, nervous system, reproductive system, life cycle**		
9	**3**	knowledge	***Class;Trematoda*** ***((Characteristics of the class and Orders)*** ***1-Liver fluckes*** ***Fasciola hepatic*** ***Clonorchis sinensis*** ***2-Intestinal fluckes*** ***Fasciolopsis buski*** ***Heterophyes heterophye*** **Blood fluckes** **Schistosomatidae** **Scistosoma haematobium** **S.mansoni** **S. Jpanicum** ***Lung fluckes*** ***Paragonimus westermai***	====	====
10	**3**	knowledge	***Class: Cestoda*** ***Characteristics of the class ,body wall installation, body system, life cycle*** ***Pseudophyllidae Order:*** ***Diphllobothrium latum*** ***Order : Cyclophyllidae*** ***Taenia saginata*** ***T. solium***	====	====

			Echinococcus granulosius ***Dipylidium caninum*** ***All parasites mentioned above are studied in the form and composition of the parasite, life cycle, pathology, epidemiology, diagnosis, prevention***		
11	**3**	knowledge	**Phyulum : Nematoda** **1- Trichinella spiralis** **2-Trichuris trichura** ***3-Ascaris lumbricoides*** ***4-Ancylostoma duodnale*** ***5-Strongyloides stercoralis*** ***All parasites mentioned above are studied in the form and composition of the parasite, life cycle, pathology, epidemiology, diagnosis, prevention***	**====**	**====**
12	**3**	Knowledge	**6-Wuchereria bancrofti** **7-Dranculus medinesis** **All parasites mentioned above are studied in the form and composition of the parasite, life cycle, pathology, epidemiology, diagnosis, prevention** **Phylum : Arthropda** **Characteristics of the class ,body wall installation, body system, life cycle**	**====**	**====**

13	**3**	Knowledge	**Classification** **Class:Insect** **Musca domestica** **Stomoxys calcitrans** **Phlebotomus papata** **Glossina** **Sarchophagidae** **Myiasis** **Mosquites**	**====**	**====**
14	**3**	knowledge	**Lice** **A- Sucking lice (human lice, pubic lice)** **B- Biting lice** **1-Poultry lice, Menopon Gallinae** **3- Menacanthus stramineus** **Fleas** **1- Pulex irritanus** 2- **Ctenocephalides**	**====**	**====**
15	**3**	Knowledge	**1- Class: Arachnida** **1- Order:Acarina** **A-Ticks (hard and soft ticks)** **B-Mites** **2- Order: Scorpionoidea** **3- Order Arenea**	**====**	**====**

47. Course Evaluation

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

30 marks (daily preparation, daily oral, monthly, or written exams, reports)
70 marks (final theoretical exam)

48. Learning and Teaching Resources	
Required textbooks (curricular books any)	not available
Main references (sources)	Atlas of medical Helminthology and protozoology-H.C.Jeffrey and R.M.Leach.third edition – 1993 Parasitology - v- medical microbiology-2005 Parasitology –Ismail AL-Hadithi and A.H.Awad – 2015 Paniker's Textbook of Medical Parasitology, seventh edition, Ck Jayaram Paniker,2013
Recommended books and references (scientific journals, reports…)	Parasitology –Ismail AL-Hadithi and A.H.Awad – 2015
Electronic References, Websites	Websites available on Google Chrome (CDC)

Course Description Form

1. Course Name:
Study seminars
2. Course Code:

3. Semester / Year:
2025-2026
4. Description Preparation Date:10 /9/2025
2025 -2026
5. Available Attendance Forms
: Daily attendance
6. Number of Credit Hours (Total) / Number of Units (Total):
2 hours (theoretical)
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Pro.dr. Nadia Hussein Ali Email: nadiasaoudi@mu.edu.iq
8. Course Objectives

Course Objectives	• **Enable the student to understand and grasp how to select the topic of a study seminar.** • **Enable the student to develop the ability to write a study seminar report.** • **Enable the student to learn how to gather resources for study seminars.** **Contribute to preparing students for advanced scientific research and graduation theses.**

9. Teaching and Learning Strategies

Interactive lecture
Demonstrative presentation (using charts and educational images via a data show/projector)
Interactive discussion and brainstorming
Self-directed learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	knowledge	Definition of the study seminar, its types, and its importance	• **Interactive lecture,** brainstorming, dialogue, discussion, self-directed learning, and oral presentation • Demonstrative presentation (using charts and educational images via a data show/projector)	Weekly, monthly, and daily exams, written exams, and end-of-term exams.
2	1	knowledge	How to choose a suitable, specific, and researchable study/research title	==========	====
3	1	knowledge	The concept of a problem, its characteristics, and how to formulate it	==========	====
4	1	knowledge	Hypotheses	==========	====
5	1	knowledge	Research plan	==========	====

6	**1**	knowledge	Scientific research methods and their tools (experimental, historical, descriptive methods	==========	**====**
7	**1**	knowledge	Research plan and its framework	==========	**====**
8	**1**	knowledge	Recording the main sections of research, the introduction, and citation methods, as well as documenting the materials and methods section	==========	**====**
9	**1**	knowledge	Collecting sources or references	==========	**====**
10	**1**	knowledge	Searching for sources: using libraries, databases, and reliable electronic resources	==========	**====**
11	**1**	knowledge	Structure of the Seminar Paper: Introduction, Literature Review, Methodology, Results, Conclusions, and References	==========	**====**
12	**1**	knowledge	Preparing the presentation: designing clear and engaging slides (PowerPoint) and avoiding unnecessary content	==========	**====**
13	**1**	knowledge	Discussion and evaluation: how to manage a Q&A session, accept feedback, and discuss results with the	==========	**====**

			audience.		
14	**1**	knowledge	Documenting sources: using scientific citation styles (such as APA or others)	==========	**====**
15	**1**	knowledge	Presentation skills: the art of standing before an audience, voice modulation, and managing allotted time	==========	**====**

11. Learning and Teaching Resources

Required textbooks (curricular books any)	not available
Main references (sources)	not available
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Websites available on Google Chrome

Course Description Form

49.	Course Name: Adv. Botany
50.	Course Code:

51. Semester / Year: 2025/2026
52. Description Preparation Date: 10/9/2025
53.Available Attendance Forms:
54.Number of Credit Hours (30h) / Number of Units (2)
55. Course administrator's name
Name: Asst. Prof. Dr. Arshad Naji Alhasnawi Email: arshad@mu.edu.iq
56. Course Objectives

Course Objectives	• The student learns about the advanced plant for the external form of the plant • Explaining the internal structure of plant cells and the functions of the organs • Identifying the division of the plant kingdom • Describes the basic structure of the plant's working mechanism
57. Teaching and Learning Strategies	
Strategy	• Presentation strategy • Brainstorming strategy • Teamwork strategy

	• Discussion strategy • Blended learning strategy • Training and application strategy • Interactive lesson strategy

58. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Introduction to Botany and Laboratory Biosafety and Security	Use learning strategies	• View questions and answers • Presenting and interpreting educational situations • The student is assigned to write a report • Tasks and duties of Kozat • Monthly exams
2	2		Plant Phenotyping, 1. Seeds and germination, Conditions for germination 2. Root: Roots - Types of Root Systems and Zones of Growth		
3	2		Stem: buds, herbaceous and woody stems, stem diameter, stem branching, stem modifications, vegetative propagation. Leaf: leaf base, leaf petiole, leaf blade, leaf shapes, leaf margin, leaf vein, modified leaves.		
4	2		Internal structure of plant cells, prokaryotic and eukaryotic plant cells		

5	2		Tissues: mesenchymal tissue, permanent tissue, ground tissue, supporting tissue, secretory tissue, connective tissue, vascular and conductive tissue.		
6	2		Internal structure of modern stems, internal structure of modern roots, internal structure of leaf, secondary thickening, effect of environment on plant anatomical structure		
7	2		Monthly examination		
8	2		Plant kingdom division, gymnosperms, angiosperms: flower, inflorescence, fruit		
9	2		Organ functions: protoplasm and colloidal state, osmosis, cell permeability to dissolved substances, water relations, mechanism of water absorption, transpiration,		
10	2		Enzymes, enzyme action, enzyme specialization, aerobic respiration, anaerobic respiration, mechanism of respiration		
11	2		Photosynthesis, mechanism of photosynthesis, non-cyclic photophosphorylation, cyclic photophosphorylation, Calvin cycle, anabolic metabolism		
12	2		Mineral nutrition, elements found in		

13	2		plants, essential and non-essential elements, the role of elements in plant nutrition, the physiological role, methods of detecting element deficiencies		
14	2		Germination and dormancy, external factors, dormancy and its causes, secondary dormancy, growth: growth zones and stages, plant hormones, flowers		
15	2		Genetics and Cell Biology, Applications of Genetic Engineering in Plants Monthly examination		

). Course Evaluation

The grade is distributed out of 100 according to the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams, reports, etc. The annual effort is calculated as follows: 30% annual effort + 70% final exam = 100%

60. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	General Botany: Dr. Ahmed Mohamed Mujahid, Dr. Mustafa Abdel Aziz, Dr. Ahmed El-Baz Younis, Dr. Abdel Rahman Amin, 2004
Recommended books and references (scientific journals, reports…)	• Introduction to Botany, Alexey Shipunov, 2021 • Plant Botany, An introduction to plant anatomy, morphology and physiology, Milena Martinková, Martin Čermák, Roman Gebauer, Zuzana Špinlerová, 2014 • Plant Anatomy and Physiology, Sean Bellairs, 2024 • Botany illustrated, Janice Glimn and Peter B. Kaufman, 2006
Electronic References, Websites	Yes