



University of Diyala
Collage of Science
Department of Biotechnology



Modules Catalogue 2026/2025

Bachelor's Degree (B.Sc.) – Biotechnology



Introduction

The educational program is considered a coordinated and organized package of academic courses that include procedures and experiences organized in the form of academic vocabulary, the main purpose of which is to build and refine the skills of graduates, making them qualified to meet the requirements of the labor market. It is reviewed and evaluated annually through internal or external audit procedures and programs such as the external examiner program .

The description of the academic program provides a brief summary of the main features of the program and its courses, indicating the skills that students are working to acquire based on the objectives of the academic program. The importance of this description is evident because it represents the cornerstone of obtaining program accreditation, and the teaching staff participates in writing it under the supervision of the scientific committees in the scientific departments .

This guide, in its second edition, includes a description of the academic program after updating the vocabulary and paragraphs of the previous ,guide in light of the latest developments in the educational system in Iraq which included a description of the academic program in its traditional form (annual, quarterly), in addition to adopting the description of the academic ,program circulated according to the book of the Department of Studies T.M.3 /3. 2906 on 5/3/2023 regarding programs that adopt th Bologna Process as a basic for their work .

In this area, we can only emphasize the importance of writing descriptions of academic programs and courses to ensure the smooth conduct of the educational process .

Concepts and terminology

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

Course Description : Provides a necessary summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he or she has 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 a developed, inspiring, motivating, realistic and applicable programmer.

Program message: It briefly explains the goals and the activities needed to achieve them, and also outlines the program's development paths and directions.

Program objectives: These 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/study subjects included in the academic program ,according to the approved learning system (semester, annual, Bologna track) ,whether it is a requirement (ministry, university, college, or scientific department) along with the number of study units .

Learning outcomes : A consistent set of knowledge, skills, and values student has acquired after the successful completion of the academic program. The learning outcomes for each course must be determined in a way that achieves the .

program objectives and learning strategies : They are the strategies used by a faculty member to and they are plans that are followed to reach ,and learning develop student teaching learning goals. That is, it describes all classroom activities and extracurricular to .achieve the learning outcomes of the program.

form Academic program description

University name: Diyala University

College/Institute: College of Science

Scientific Department: Department of Biotechnology

Name of the academic or professional program: Bachelor's degree Name of final degree:

Bachelor of Biotechnology Study system: semester system

Description preparation date: 1/95/2025

Date of filling the file: 10/9/2025



التوقيع:

اسم المعاون العلمي: ا.د منذر حمزة راضي

التاريخ: 2025/9/10



التوقيع

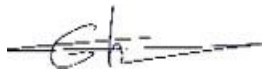
اسم رئيس القسم : ا.د علياء معن عبد الحميد

التاريخ: 2025/9/10

Check the file before

Division of Quality Assurance and University Performance

Name of the Director of the Quality Assurance and University



Ghassan Sabeeh Mahmood



Authentication of the Dean

Prof. Dr. Taha Muhammad Hassan

1. See the program

Working according to a solid program that achieves leadership and excellence in the academic and research field, taking into account national and international quality standards and academic accreditation.

2. Program message

The Department of Biotechnology is committed to providing specialized programs that meet national needs, including qualifying students with the skills and knowledge necessary for the requirements and needs of society Commitment to national and international quality standards in preparing competent graduates capable of academic and research work and meeting the requirements of the labor market The department seeks to improve and develop program quality standards to keep pace with the continuous changes in community needs through periodic review of the department's plan, goals, and missin.

3. Program Goals

Providing the labor market with graduates with a high level of scientific and practical competence Developing scientific and academic research capabilities and encouraging innovation for teachers and students Transferring the cognitive skills of teachers, researchers and graduates to society Achieving advanced ranks in academic classifications locally, regionally and globally Communicating with leading local and international academic and research bodies to achieve the maximum possible benefit by forming joint research teams and benefiting from accumulated experience and research capabilities for scientific advancement.

4. program accreditation

The Biotechnology Department's accreditation file has been submitted for program accreditation in the scientific disciplines

5. Other external influences

No

6. Program structure

Program structure	Number of courses	Study unit	percentage	* comments
Enterprise requirements	4	9	7.4%	
College requirements	6	35	28.9%	
Department requirements	38	121	100%	
summer training	1	Satisfied	7.4%	
Other				

.Notes may include whether the course is core or elective *

7. Program description

Year/level	Course or course code	Name of the course or course	Credit hours	
Fourth/first		Plant tissue culture	2	2
		Immunological genetics	2	2
		Enzymes	2	2
		Medicinal mushrooms	2	2
		Bioinformatics	2	2
Fourth/second		Plant chemistry	2	2
		toxicology	2	2
		Industrial microbiology	2	2
		Genetic Engineering	2	2
		Satisfactory analyzes	2	2
		Research project		

8. Expected learning outcomes of the program

Knowledge

Learning outcomes 1	Satisfied
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Skills

Learning outcomes 2	Satisfied
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Learning outcomes 3	Satisfied
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Value

Learning outcomes 4	Satisfied
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Learning outcomes 5	Satisfied
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9. Teaching and learning strategies

- 1- Theoretical lectures according to the approved curriculum.
- 2- Quizzes and brainstorming after the lecture.
- 3- Conduct scientific discussions in class.
- 4- Submitting scientific reports on the subject area during the semester.
- 5- Stimulating knowledge exchange among students.

10. Evaluation methods

- This is done by testing students theoretically, practically, and orally (seminars) ,classroom activities, and more Safia, scientific reports .
- Motivating the student by encouraging the free generation of ideas, accepting them, and training him in the skill of brainstorming.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements /Skills (if applicable)	Number of the teaching staff	
				Staff	Lecturer
	General	Special		1	
Professor	Biology	Biotechnology		2	
Assistant Professor	Biology	Medicinal plants		1	
Assistant Professor	Biology	Plants		1	
Assistant Professor	Biology	Microbiology		1	
Assistant Professor	Biology	Biotechnology		1	
Lecturer	Biology	Plant/ Mycology		1	
Lecturer	Biology	Biotechnology		2	
Lecturer	Biology	Microbiology		2	
Assistant Lecturer	Biotechnology	Biotechnology		2	
Assistant Lecturer	Biology	Zoology		2	
Assistant Lecturer	Biology	Ecology		1	
Assistant Lecturer	Biology	Cytology		5	
Assistant Lecturer	Biology	Biology		1	
Assistant Lecturer	Biology	Parasitology		1	
Assistant Lecturer	Biology	Tissues and Anatomy Animal		3	
Assistant Lecturer	Biology	Analytical Chemistry		2	
Assistant	Biology	Microbiology		2	

Lecturer					
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Professional development

Orienting new faculty members

- The new faculty member's familiarity with the university, its development vision, its plan towards internationalization, and its development programs.
- Helping the new faculty member adapt practically and psychologically and alleviating anxiety that could hinder his participation and integration into university work and activities.
- Providing the opportunity for the new faculty member to build a network of relationships and communicate with his peers from other departments and colleges.
- The new faculty member's familiarity with his rights and duties (administrative and legal) Developing the faculty member's skills in teaching, learning, and managing the educational process

Professional development for faculty members

- Technical development and its implications on the educational process in terms of employing information and communication technology and learning and teaching techniques.
- Institutional development, which includes development planned and supervised by a specialized unit at the university , which can employ ongoing training courses, workshops discussion panels, hosting visiting professors, and exchanging visits and research contributions.
- Holding continuing education courses on teaching methods, developments in them, and keeping pace with them Self-development to acquire psychological and cognitive skills
- Continuous improvement and development of faculty members through training programs and workshops inside and outside the department, university and country Encouraging faculty members to obtain the highest academic and administrative ranks through promotions.

12. Acceptance standard

The Biotechnology Department is subject to the work mechanism of the Ministry of Higher Education and Scientific Research/Central Admissions Department, where graduates of preparatory school (scientific branch) are nominated for admission to the department based on their graduation rates.

13. The most important sources of information about the program

- The curriculum approved by the Ministry of Higher Education and Scientific Research and its guidelines.
- Decisions and recommendations of scientific committees in the department and university .
- Courses in developmental teaching methods.
- Self-evaluation report for previous years SSR.
- Description of courses.
- Conferences, seminars, workshops and panel discussions.
- State institutions related to the department's specializations.
- Graduates Unit.
- Searches in global databases for similar experiences.
- Personal experiences.

14. Program development plan

Modernizing study plans and scientific curricula by keeping pace with global developments and using modern sources to keep pace with the labor market, as well as modernizing, developing and diversifying learning and teaching methods.

Program Skills Outline															
Required program Learning outcomes															
Value				Skills				Knowledge				Essential/ Optional	Course Name	Course Code	Year/L evel
1a	2a	3a	4a	1b	2b	3b	4b	1c	2c	3c	4c				
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Plant tissue culture		Fourth
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Immunological genetics		
√	√	√	√	√	√	√	√	√	√	√	√	Optional	Enzymes		
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Medicinal mushrooms		
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Bioinformatics		
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Plant chemistry		
√	√	√	√	√	√	√	√	√	√	√	√	Optional	Toxicology		
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Industrial microbiology		
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Genetic Engineering		
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Satisfactory analyzes		
√	√	√	√	√	√	√	√	√	√	√	√	Basic	Research project		

FOURTH LEVEL

Course Description Form

1. Course Name: Bioinformatics				
2. Course Code:				
3. Semester/Year: Fourth Year				
Semester / First Semester				
4. Description Preparation Date:				
1/9/2025				
5. Available Attendance Forms:				
Weekly				
6. Number of Credit Hours (Total)/Number of Units (Total)				
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)				
3 Units				
7. Course Administrator's Name (mention all, if more than one name)				
Prof.Dr. Bashar Talib AL-Nuaimi E-mail alnuaimi_bashar@uodiyala.edu.iq				
8. Course Objectives				
Course Objectives	- Provide students with the basic concepts and applications of bioinformatics and computational biology. - Introduce genome analysis, sequence alignment, and phylogenetics. - Train students on the use of bioinformatics tools for analyzing biological data. - Enable students to perform database searching and sequence comparisons (BLAST, FASTA). - Correlate molecular biology and biochemistry with computational approaches.			
9. Teaching and Learning Strategies				
Strategy	- Lectures with PowerPoint presentations. - Laboratory experiments and practical demonstrations. - Seminars, group discussions, and student presentations. - Case studies and problem-solving assignments.			
10. Course Structure				
Week	Hours	Topics	Learning Method	Evaluation Method
1	4 hrs	Introduction to Bioinformatics: what and why?	Lecture	Oral/written exam
2	4 hrs	Genomes and chromosomes, genetic	Lecture, lab	Quiz

		code		
3	4 hrs	Evolution and origin of species	Lecture	Assignment
4	4 hrs	Phylogenetic analyses	Lecture, lab	Report
5	4 hrs	Phylogenetic tree construction	Lecture, lab	Practical
6	4 hrs	Sequence alignment, scoring matrices, pairwise alignment	Lecture, lab	Quiz
7	4 hrs	First Exam	Written exam	Exam
8	4 hrs	Multiple sequence alignment	Lecture, lab	Report
9	4 hrs	Probabilistic models of genome sequences	Lecture	Assignment
10	4 hrs	Database searching: BLAST, FASTA	Lecture, lab	Practical
11	4 hrs	Genomic sequences and online databases	Lecture, lab	Quiz
12	4 hrs	Bioinformatics tools for the laboratory	Lecture, lab	Assignment
13	4 hrs	Second Exam and final review	Written exam	Final exam

11. Course Evaluation

Quizzes, Assignments, Laboratory reports, Midterm exam, Practical exam, Final exam

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	• Lesk, A. (2019). <i>Introduction to Bioinformatics</i>. Oxford University Press. • Baxevanis, A.D., Bader, G.D., & Wishart, D.S. (2020). <i>Bioinformatics</i>. John Wiley & Sons.
Main References (sources)	- <i>Bioinformatics</i> (Oxford Academic Journal) - <i>Briefings in Bioinformatics</i> - <i>Nucleic Acids Research (NAR)</i>
Recommended Books and References (scientific journals, reports ... etc.)	• https://www.bioinformatics.org/ • PubMed, NCBI databases • International bioinformatics networks
Electronic References (websites ... etc.)	• PubMed and scientific journal websites

Course Description Form

1. Course Name:
Enzymology
2. Course Code:
3. Semester/Year:

First Semester				
4. Description Preparation Date:				
1/9/2025				
5. Available Attendance Forms:				
Weekly				
6. Number of Credit Hours (Total)/Number of Units (Total)				
3 Units				
7. Course Administrator's Name (mention all, if more than one name)				
Name: Ziyad Khalouf Radeef				
Email: zeyadkh.radeef@uodiyala.edu.iq				
8. Course Objectives				
Course Objectives	• Understand the importance of enzymes in medical, pharmaceutical, industrial, and agricultural fields. • Learn the methods of enzyme extraction and purification. • Recognize the applications of enzymes in various areas: Medical, Pharmaceutical, Industrial, Agricultural, Research			
9. Teaching and Learning Strategies				
Strategy	A. Knowledge and Understanding 1. Define enzymes, their chemical nature, and biological importance. 2. Describe enzyme structure, active sites, and catalytic mechanisms. 3. Explain enzyme classification and nomenclature. 4. Identify enzyme cofactors, inhibitors, and activators. 5. Recognize enzyme kinetics, reaction mechanisms, and regulatory processes. B. Intellectual Skills 1. Interpret experimental data related to enzyme activity. 2. Analyze enzyme kinetics and draw meaningful conclusions. 3. Evaluate enzyme inhibition and activation mechanisms. 4. Apply knowledge of enzymes to practical case studies in medicine, pharmacy, and biotechnology. C. Practical and Professional Skills 1. Conduct laboratory experiments to measure enzyme activity. 2. Use PowerPoint for scientific presentation. 3. Apply laboratory skills in enzyme purification and analysis. 4. Prepare reports and scientific discussions on enzyme-related experiments. General and Transferable Skills 1. Develop teamwork, communication, and problem-solving skills. 2. Apply quality standards in scientific work. Use scientific references and modern information sources.			
10. Course Structure				
Week	Hours	Required Learning Outcomes	Learning Method	Evaluation Method
1	4 hrs	Introduction: Definition, importance, and properties of enzymes	Lectures, seminars	Oral and written exams

2	4 hrs	Enzyme structure, active sites, and catalytic mechanisms	Lectures, seminars	Quizzes
3	4 hrs	Enzyme classification and nomenclature	Lectures	Written exam
4	4 hrs	Factors affecting enzyme activity (temperature, pH, substrate concentration)	Lectures, lab	Reports, quizzes
5	4 hrs	Enzyme kinetics (Michaelis–Menten equation)	Lectures, lab	Midterm exam
6	4 hrs	Enzyme inhibition (competitive, non-competitive, uncompetitive)	Lectures, lab	Practical exam
7	4 hrs	Enzyme cofactors, coenzymes, and prosthetic groups	Lectures	Oral exam
8	4 hrs	Isoenzymes and their clinical importance	Lectures	Quizzes
9	4 hrs	Allosteric enzymes and regulation	Lectures, seminars	Assignments
10	4 hrs	Applications of enzymes in medicine and pharmacy	Lectures	Reports
11	4 hrs	Applications of enzymes in industry and agriculture	Lectures, lab	Practical evaluation
12	4 hrs	Revision and final preparation	Lectures, seminars	Written exam
13	4 hrs	Second Exam (Final assessment)	Exam	Final exam

11. Course Evaluation

Evaluation includes quizzes, assignments, reports, midterm exam, practical exam, and final exam.

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	- Lehninger Principles of Biochemistry – David L. Nelson & Michael M. Cox - Medical Biochemistry – M. N. Chatterjea & Rana Shinde
Main References (sources)	Scientific papers and review articles in the field of enzymology.
Recommended Books and References (scientific journals, reports ... etc.)	- Essentials of Enzymology – N. S. Punekar - Enzymes: Catalysis, Kinetics, and Mechanisms – N. S. Punekar
Electronic References (websites ... etc.)	.Online resources and recent research updates -

course Description Form

1. Course Name:				
Immunogenetics				
2. Course Code: BT 404				
3. Semester/Year: Fourth Year				
Semester / First Semester				
4. Description Preparation Date:				
1/9/2025				
5. Available Attendance Forms:				
Weekly				
6. Number of Credit Hours (Total)/Number of Units (Total)				
3 Units				
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)				
7. Course Administrator's Name (mention all, if more than one name)				
Name: Duha Farhan Nasrallah				
dhuhaf.n.bani_wais@uodiyala.edu.iq				
8. Course Objectives				
Course Objectives	- Introduce students to the history, scope, and development of immunology. - Identify different types of immunity and the factors influencing them. - Study immune cells, their mechanisms of action, and lymphoid organs. - Understand immune responses, antigens, antibodies, and hypersensitivity reactions. - Explore the major histocompatibility complex (MHC) and its immune relevance. - Examine cytokines and immune signaling molecules.			
9. Teaching and Learning Strategies				
Strategy	- Lectures with PowerPoint presentations. - Group discussions and seminars. - Practical laboratory sessions. - Assignments and student presentations.			
10. Course Structure				
Week	Hours	Topics	Learning Method	Evaluation Method
Week 1	4 hrs	Introduction to immunology:	Lectures,	Oral and

		history, scope, development	seminars	written exams
Week 2	4 hrs	Types of immunity: innate vs adaptive	Lectures, seminars	Quizzes
Week 3	4 hrs	Innate immunity: physical, chemical, and biological barriers	Lectures, lab	Reports, quizzes
Week 4	4 hrs	Inflammation and immune cells	Lectures, lab	Practical exam
Week 5	4 hrs	Adaptive immunity: humoral and cellular responses	Lectures, lab	Midterm exam
Week 6	4 hrs	Lymphoid organs and immune cells	Lectures	Oral exam
Week 7	4 hrs	Antigens: properties and types	Lectures	Quizzes
Week 8	4 hrs	Antigen processing and presentation	Lectures	Assignments
Week 9	4 hrs	Antibodies: structure, function, synthesis	Lectures, lab	Reports
Week 10	4 hrs	Antigen–antibody interactions	Lectures, lab	Practical evaluation
Week 11	4 hrs	Hypersensitivity reactions	Lectures	Quizzes
Week 12	4 hrs	Complement system and immune regulation	Lectures	Written exam
Week 13	4 hrs	Cytokines and immune signalling	Lectures	Assignments
Week 14	4 hrs	Autoimmunity and immunodeficiency	Lectures	Reports
Week 15	4 hrs	Final review and assessment	Lectures	Final exam

11. Course Evaluation

Evaluation includes quizzes, assignments, reports, midterm exam, practical exam, and final exam.

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	- Essential Immunology - Molecular Immunology - Cellular Immunology
Main References	- Journal of Immunology - Journal of Clinical Immunology
Recommended Books and References (scientific journals, reports ... etc.)	- American Journal of Immunology - European Journal of Cellular Immunology
Electronic References (websites ... etc.)	- International immunology networks and online databases - PubMed and scientific journal websites

Course Description Form

1. Course Name:				
Industrial Microbiology				
2. Course Code: BT 302				
3. Semester/Year: Fourth Year				
Semester / Second Semester				
4. Description Preparation Date:				
1/9/2025				
5. Available Attendance Forms:				
Weekly				
6. Number of Credit Hours (Total)/Number of Units (Total)				
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)				
3 Units				
7. Course Administrator's Name (mention all, if more than one name)				
Hiba Ali Hilal e-mail Hiba.a@uodiyala.edu.iq				
8. Course Objectives				
Course Objectives	- Introduce students to the scope and importance of industrial microbiology. - Provide knowledge about the production of important microbial products such as antibiotics, amino acids, organic acids, enzymes, vitamins, vaccines, and food products. - Train students in techniques for isolation, maintenance, and preservation of industrial strains. - Demonstrate microbial production processes such as fermentation for ethanol, single-cell protein, and bioactive metabolites. - Enable students to analyze, optimize, and improve microbial processes for industrial applications.			
9. Teaching and Learning Strategies				
Strategy	- Lectures with PowerPoint presentations. - Laboratory experiments and practical demonstrations. - Seminars, group discussions, and student presentations. - Case studies and problem-solving assignments.			
10. Course Structure				
Week	Hours	Required Learning Outcomes	Learning Method	Evaluation Method
1	4 hrs	Industrial media and nutrition of	Lecture, lab	Oral and

		microorganisms		written exam
2	4 hrs	Sterility in industrial microbiology	Lecture, lab	Report
3	4 hrs	Maintenance and preservation of industrial strains	Lecture, lab	Quiz
4	4 hrs	Isolation of <i>Bacillus</i> sp. from soil and bacteriocin production	Lecture, lab	Practical exam
5	4 hrs	Production of single-cell protein (SCP) from yeast	Lecture, lab	Midterm exam
6	4 hrs	Midterm exam	Written exam	Exam
7	4 hrs	Production of ethanol (biofuel) from wastepaper	Lecture, lab	Report
8	4 hrs	Production of cellulase by microorganisms	Lecture, lab	Practical evaluation
9	4 hrs	Production of protease by <i>Aspergillus niger</i> (solid-state fermentation)	Lecture, lab	Assignment
10	4 hrs	Production of amino acids	Lecture, lab	Quiz
11	4 hrs	Production of organic acids	Lecture, lab	Report
12	4 hrs	Production of antibiotics	Lecture, lab	Written exam
13	4 hrs	Enzyme technology	Lecture, lab	Report
14	4 hrs	Production of amylase	Lecture, lab	Assignment
15	4 hrs	Final review and second exam	Lecture	Final exam

11. Course Evaluation

- Quizzes
- Assignments
- Laboratory reports
- Midterm exam
- Practical exam
- Final exam

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	• Okafor, N. (2016). <i>Modern Industrial Microbiology and Biotechnology</i>. CRC Press. • Waites, M.J., Morgan, N.L., Rockey, J.S., & Higton, G. (2002). <i>Industrial Microbiology: An Introduction</i>. Blackwell Science, Oxford, UK.
Main References (sources)	• Main References (sources) • Journal of Industrial Microbiology & Biotechnology • Applied Microbiology and Biotechnology Journal
Recommended Books and References (scientific journals, reports ...)	• Food and Industrial Microbiology journals • Bioprocess Engineering references

etc.)	
Electronic References (websites ... etc.)	• PubMed and scientific journal websites • International fermentation and biotechnology networks

Course Description Form

1. Course Name:					
Plant tissue culture					
2. Course Code:					
3. Semester / Year: First Semester					
Semester program / 2025 – 2026					
4. Description Preparation Date:					
22 /8/ 2025					
5. Available Attendance Forms:					
Mandatory Attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
4 weekly (2 hours theoretical part _ 2 hours practical part) + 3 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr Alhan mohammed alwan					
Email: alhanalwan@gmail.com					
8. Course Objectives					
Course Objectives					
1. Teaching and Learning Strategies *Explaining the basic principles of tissue culture 2. *Clarification of methods for establishing a tissue culture laboratory. 3. *Study of types of plant hormones 4. *Study of types of sterilizers 5. *Study of chemical and hormonal analyses.					
Strategy		The graduate must be able to know and understand all of the following: 1. The basic principles of laboratory establishment methods 2. Knowing and understanding all types of analyzes and plant hormones. 3. Knowing and understanding all laboratory sterilization methods 4. Knowing and understanding all chemical and hormonal analyses			
6. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

First	(2T+2P)	Collecting Samples for Laboratory Testing	Collecting Samples for Laboratory Testing	PowerPoint+ Kits and Lab. materials	Daily Exams
Second	(2T+2P)	Basic concepts of plant tissue culter	Basic concepts of plant tissue culter	PowerPoint+ Kits and Lab. materials	Daily Exams
Third	(2T+2P)	Plant tissue culture application	Plant tissue culture application	PowerPoint+ Kits and Lab. materials	Daily Exams
Four	(2T+2P)	Type of plant hormones	Type of plant hormones	PowerPoint+ Kits and Lab. materials	Daily Exams
Five	(2T+2P)	Exam.	Exam.	PowerPoint	
Six	(2T+2P)	Culture media	Culture media	PowerPoint+ Kits and Lab. materials	Daily Exams
Seven	(2T+2P)	Functions of culture media	Functions of culture media	PowerPoint+ Kits and Lab. materials	Daily Exams
Eight	(2T+2P)	Essential elements for plant growth	Essential elements for plant growth	PowerPoint+ Kits and Lab. materials	Daily Exams
Nine	(2T+2P)	Preparation of media	Preparation of media	PowerPoint+ Kits and Lab. materials	Daily Exams
Ten	(2T+2P)	Sterilization	Sterilization	PowerPoint+ Kits and Lab. materials	Daily Exams
Eleven	(2T+2P)	Physical method	Physical method	PowerPoint+ Kits and Lab. materials	Daily Exams
Twelve	(2T+2P)	Callus culture	Callus culture	PowerPoint+ Kits and	Daily Exams

				Lab. materials	
Thirteen	(2T+2P)	Isolation and culture of protoplast	Isolation and culture of protoplast	PowerPoint+ Kits and Lab. materials	Daily Exams
Fourteen	(2T+2P)	Micropropagation	Micropropagation	PowerPoint+ Kits and Lab. materials	Daily Exams
Fifteen	(2T+2P)	Exam.	Exam.	PowerPoint	

7. Course Evaluation

theoretical part	Final Exam / 34 degree	First Mid Exam. 14 degrees Second Mid Exam. 14 degrees Daily Exam. 6 degrees
practical part	Final Exam / 16 degree	First Mid Exam. 6 degrees Second Mid Exam. 6 degrees Daily Exam. 4 degrees

8. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Basic of tissue culture
Main references (sources)	
Recommended books and references (scientific journals, reports..)	
Electronic References, Websites	

Course Description Form

1. Course Name:	Toxicology
2. Course Code:	
3. Semester/Year:	2025- 2026
Semester	second
4. Description Preparation Date:	
	1/9/2025

5. Available Attendance Forms:

weekly

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

60

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

Name: Dr. Najwan Abbas Mohammed

Email: najwanabbas@uodiyala.edu.iq**8. Course Objectives****Course Objectives**

1. Understand fundamental principles of toxicology – including dose-response relationships, mechanisms of toxicity, and the factors that influence toxic effects in humans, animals, and the environment.
2. Identify and evaluate toxic agents – such as chemicals, drugs, natural toxins, and environmental pollutants, along with their toxicokinetics (absorption, distribution, metabolism, excretion) and toxicodynamics (biological effects).
3. Apply toxicological knowledge in practice – through risk assessment, interpretation of toxicological data, and applying safety regulations and guidelines in clinical, occupational, pharmaceutical, and environmental contexts.

9. Teaching and Learning Strategies**Strategy**

1. Lectures and Interactive Discussions – to deliver core concepts of toxicology and encourage critical thinking through case-based discussions.
2. Laboratory Sessions and Practical Demonstrations – to give students hands-on experience with toxicological assays, dose-response experiments, and safety practices.
3. Problem-Based and Case Study Learning – using real-world toxicology scenarios (e.g., poisoning cases, environmental contamination, drug toxicity) to develop analytical and problem-solving skills.
4. Seminars and Student Presentations – to enhance communication skills and deepen understanding by reviewing toxicology research articles and emerging issues.

5. E-Learning Tools and Simulations – such as virtual labs, toxicology databases, and risk assessment software to supplement traditional teaching.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	4h		Toxicology: definition History of toxins	PowerPoint+ educational video + lecture PDF	Daily Exams
2	4h		Scope and ethical principles of Toxicology	=	Daily Exams
3	4h		Biotransformation of Xenobiotics and Toxikinetis	=	Daily Exams
4	4h		Hepatotoxins: Mycotoxins	=	Daily Exams
5	4h		Hepatotoxins: Pyrrolizidines	=	Daily Exams
6	4h		Algal Hepatotoxins	=	Daily Exams
7	4h		First Exam		
8	4h		Neurotoxins	=	Daily Exams
9	4h		Toxicology of the Kidney and Intestine	=	Daily Exams
10	4h		Toxicology of the Skin	=	Daily Exams
11	4h		Cardiovascular Toxicology	=	Daily Exams
12	4h		Interesting of toxins	=	Daily Exams
13	4h		Environmental Toxicology	=	Daily Exams
14	4h		Ethical principles of Toxicology	=	Daily Exams
15			Exam		

11. Course Evaluation

- **Midterm Examination** *Tests understanding of fundamental concepts and principles of toxicology.*
- **Laboratory Work / Practical Reports** *Assessment of hands-on skills, safety practices, and data interpretation.*
- **Assignments / Case Studies / Presentations** *Evaluates critical thinking, application of toxicology to real-world problems, and communication skills.*
- **Quizzes / Continuous Assessment** *Short tests to encourage consistent learning throughout the course.*
- **Final Examination**

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	1. Mycotoxins, (2008) Editor: Leslie. 2. Poisonous plants in Iraq, (1980). Editor: Ali Alrawi 3. Poisonous plants in southern United States, (2005). Editor: John W. Everest et al 4. Algae (2006) Editor: Barsanti and Gualtieri
Main References (sources)	1. Manual Of Methods Of Analysis Of Foods, (2016). By: Food Safety And Standards Authority Of India Ministry Of Health And Family Welfare Government Of India, New Delhi. 2. The Pesticide Manual, (2012). Editor: C. MacBean
Recommended Books and References (scientific journals, reports ... etc.)	1. A Textbook of Modern Toxicology – by Ernest Hodgson. 2. A comprehensive text that provides clear explanations of toxicological principles, with applied examples. 3. Hayes' Principles and Methods of Toxicology – by A. Wallace Hayes. 4. Focuses on methodologies, testing approaches, and practical aspects of toxicological research and safety assessment
Electronic References (websites ... etc.)	☐ Agency for Toxic Substances and Disease Registry (ATSDR) https://www.atsdr.cdc.gov <i>Health effects, toxicological profiles, and case studies of hazardous substances.</i> ☐ U.S. Environmental Protection Agency (EPA) – Toxicology and Risk Assessment https://www.epa.gov

Course Description Form

1. Course Name:				
Pathological Analyses				
2. Course Code:				
3. Semester/Year: Fourth Year				
Semester / Secound Semester				
4. Description Preparation Date:				
1/9/2025				
5. Available Attendance Forms:				
Weekly				
6. Number of Credit Hours (Total)/Number of Units (Total)				
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)				
3 Unite				
7. Course Administrator's Name (mention all, if more than one name)				
Assist. Lec. Farah M. Zaidan e-mail farahmizhar@uodiyala.edu.iq				
8. Course Objectives				
Course Objectives	- Provide students with the fundamental principles of pathological laboratory tests. - Demonstrate the role of pathological analyses in medical diagnosis. - Identify the different types of diagnostic tests and their clinical applications. - Develop knowledge of interpreting results and understanding sources of error in diagnostic testing. - Enhance students' ability to correlate laboratory findings with disease conditions. - Strengthen problem-solving skills in analyzing and evaluating diagnostic results.			
9. Teaching and Learning Strategies				
Strategy	- Lectures with PowerPoint presentations. - Laboratory demonstrations and practical experiments. - Group discussions and interactive participation. - Assignments and student seminars. - Field visits and case-based learning.			
10. Course Structure				
Week	Hours	Required Learning Outcomes	Learning Method	Evaluation Method
1	4 hrs	Introduction: importance and	Lecture	Oral questions,

		types of pathological tests		written exam
2	4 hrs	General urine examination	Lecture, lab	Report
3	4 hrs	Stool examination and parasitology tests	Lecture, lab	Quiz
4	4 hrs	Blood sugar and renal function tests	Lecture, lab	Practical exam
5	4 hrs	Blood analysis and bone marrow tests	Lecture, lab	Midterm exam
6	4 hrs	Cerebrospinal fluid (CSF) analysis	Lecture, lab	Report
7	4 hrs	Complete blood count (CBC)	Lecture, lab	Quiz
8	4 hrs	Blood smears and differential count	Lecture, lab	Report
9	4 hrs	Liver function tests	Lecture, lab	Practical evaluation
10	4 hrs	Clinical chemistry tests	Lecture, lab	Assignment
11	4 hrs	Serological tests	Lecture, lab	Quiz
12	4 hrs	Interpretation of clinical chemistry results	Lecture	Written exam
13	4 hrs	Urine chemical analysis	Lecture, lab	Report
14	4 hrs	Interpretation of urine test results	Lecture	Assignment
15	4 hrs	Final review and overall assessment	Lecture	Final exam

11. Course Evaluation

Evaluation includes quizzes, assignments, reports, midterm exam, practical exam, and final exam.

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	A Manual of Laboratory and Diagnostic Tests, 8th Edition, Lippincott Williams & Wilkins (2009)
Main References (sources)	- Journal of Laboratory Medicine - Journal of Clinical Pathology - International Laboratory Accreditation Cooperation (ILAC)
Recommended Books and References (scientific journals, reports ... etc.)	• Health Management Technology magazine • Journal of Laboratory Automation
Electronic References (websites ... etc.)	• PubMed and scientific journal websites • International laboratory diagnostic networks

Course Description Form

1. Course Name:					
Plant Chemistry					
2. Course Code:					
3. Semester/Year:					
Secound Semester /2025-2026					
4. Description Preparation Date:					
1/9/2025					
5. Available Attendance Forms:					
Weekly					
6. Number of Credit Hours (Total)/Number of Units (Total)					
30 hour/ 3 unit					
7. Course Administrator's Name (mention all, if more than one name)					
Name: Assistant Professor Dr. Shaymaa Al-Majmaie					
Email: shaymaa@uodiyala.edu.iq					
8. Course Objectives					
Course Objectives		By the end of this course, students will be able to: - Explain the fundamentals of molecular biology in both prokaryotic and eukaryotic organisms. - Demonstrate understanding of cellular processes at the molecular level. - Explore the potential applications of plant chemistry in the pharmaceutical, medical, and industrial fields.			
9. Teaching and Learning Strategies					
Strategy		Students will: - Understand the principles of plant chemistry, ethnopharmacology, and pharmacognosy. - Gain familiarity with bioactive plant compounds and their physiological effects. - Learn about the therapeutic, toxic, and nutritional aspects of plant constituents. - Recognize the significance of plant-based compounds in the development of modern medicine.			
10. Course Structure					
Week	Hour	Requi red	Unit or Subject Name	Learning	Evaluation

	s	Learn ing Outco mes		Method	Method
1	4		Introduction and Overview	Lecture ,demonstrations ,interactive discussion and self-education	Introduction to computer, basic definition ,interactive discussion and oral and written tests
2	4		History of Plant Use in Medicine (Part I)	=	=
3	4		History of Plant Use in Medicine (Part II)	=	=
			Therapeutic Uses of Plants		
4	4		Pharmacognosy, Ethnopharmacology, and Chemistry of Medicinal Plants	=	=
5	4		Psychoactive Plants	=	=
6	4		Exam	=	=
7	4		Plant-Induced Diseases in Humans and Animals	=	=
8	4		Nutritional and Health Benefits of Food Plants	=	=
9	4		Contribution of Medicinal Plants to Traditional and Modern Medicine	=	=
10	4		Medicinal Plants of the American and Mexican West	=	=
11	4		Plant Investigation Methods	=	=
12	4		Overview of Structural Identification Methods	=	=

13	4		Secondary Metabolism	=	=
14	4		Plant Investigation Methods	=	=
15	4		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

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	M. Daniel. <i>Medicinal Plants: Chemistry and Properties</i> . 1st Edition. Textbook of Plant Chemistry (2011).
Main References (sources)	
Recommended Books and References (scientific journals, reports ... etc.)	
Electronic References (websites ... etc.)	

Course Description Form

1. Course Name:
Genetic Engineering
2. Course Code:
3. Semester/Year: Fourth Year
Semester / Secound Semester
4. Description Preparation Date:
1/9/2025
5. Available Attendance Forms:

Weekly

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

4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)

3 Units

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

Name:

Email: biotech@uodiyala.edu.iq

8. Course Objectives

Course Objectives	• Cover the fundamental principles of genetic engineering in prokaryotic and eukaryotic systems. • Understand cloning strategies and steps of gene manipulation. • Introduce techniques for DNA isolation, plasmid preparation, and vector construction. • Train students on the application of restriction enzymes and cloning vectors. • Apply theoretical and practical knowledge to modern biotechnological and medical research.
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9. Teaching and Learning Strategies

Strategy	• Lectures with PowerPoint presentations. • Practical laboratory sessions. • Seminars, group discussions, and assignments. • Student presentations and reports.
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10. Course Structure

Wee k	Hour s	Topics	Learning Method	Evaluation Method
1	4 hrs	Introduction to Genetic Engineering	Lecture	Oral/written exam
2	4 hrs	Cloning steps	Lecture, lab	Quiz
3	4 hrs	Isolation of total DNA	Lecture, lab	Assignment
4	4 hrs	Isolation of plasmid DNA	Lecture, lab	Practical
5	4 hrs	Restriction enzymes	Lecture, lab	Report
6	4 hrs	Types of restriction enzymes	Lecture, lab	Quiz
7	4 hrs	Factors affecting restriction enzymes	Lecture	First Exam
8	4 hrs	Cloning vectors	Lecture, lab	Assignment
9	4 hrs	Types of cloning vectors	Lecture, lab	Report
10	4 hrs	Plasmids	Lecture, lab	Quiz
11	4 hrs	Phages	Lecture, lab	Practical
12	4 hrs	Cosmids	Lecture, lab	Report
13	4 hrs	Expression vectors	Lecture, lab	Assignment
14	4 hrs	Applications of cloning vectors in genetic engineering	Lecture, lab	Practical evaluation

15	4 hrs	Second Exam	Written exam	Final exam
11. Course Evaluation				
• Quizzes • Assignments • Laboratory reports • Midterm exam • Practical exam • Final exam				
12. Learning and Teaching Resources				
Required Textbooks (curricular books, if any)		• Glover, D. M. (2013). <i>Genetic Engineering: Cloning DNA</i>. Springer Science & Business Media. • Kurnaz, I. A. (2015). <i>Techniques in Genetic Engineering</i>. CRC Press.		
Main References (sources)		• <i>Journal of Genetic Engineering and Biotechnology</i> • <i>Nature Reviews Genetics</i> • <i>Trends in Biotechnology</i>		
Recommended Books and References (scientific journals, reports ... etc.)		• Electronic References •		
Electronic References (websites ... etc.)		• NCBI (https://www.ncbi.nlm.nih.gov/) • PubMed • International genetic engineering databases		

Course Description Form

1. Course Name:
Medical mycology
2. Course Code:
3. Semester / Year:
First Semester
4. Description Preparation Date:
1 / 9/ 2025
5. Available Attendance Forms:
Mandatory Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
3 units (60 study hours)
7. Course administrator's name (mention all, if more than one name)

Dr. Najwan Abbas Mohammed

Email: najwanabbas@uodiyala.edu.iq

8. Course Objectives

Course Objectives	➤ Introduce students to fungi, their increasing importance, their characteristics, methods of identification, preservation, and classification. ➤ Explain the role of fungi and yeasts in the decomposition of organic and mineral materials, forming active organisms that participate in ecological balance and serve as the second most widespread living group after bacteria. ➤ Familiarize students with the clinical classification of fungi, diagnostic methods, and chemical/microscopic techniques used in fungal studies. ➤ Introduce students to pathogenic fungi, methods of treatment, and beneficial fungi used in industry and biological processes.
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This course provides a proposed framework to clarify the objectives of the subject and the expected learning outcomes for students, ensuring that they benefit from the available educational opportunities. It is also necessary to establish a link between the description and the learning outcomes.

Strategy	The graduate must be able to know and understand all of the following: ➤ Understand theoretical basics and scientific principles of fungi. ➤ Acquire scientific research skills, experimental design, and problem solving. ➤ Recognize the importance of scientific concepts in applied sciences. ➤ Learn scientific terminology and language related to fungi. ➤ Develop scientific thinking and reasoning skills. ➤ Improve organizational abilities in handling laboratory work. ➤ Promote personal responsibility and ethical conduct in research.
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9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
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First	(2T+2P)		Definition of Mycology	PowerPoint+ Kits and Lab. materials	Daily Exams
Second	(2T+2P)		Morphology of Fungi – Molds and yeasts.	PowerPoint+ Kits and Lab. materials	Daily Exams
Third	(2T+2P)		Fungal Cell Structure and Function	PowerPoint+ Kits and Lab. materials	Daily Exams
Four	(2T+2P)		Reproduction of Fungi	PowerPoint+ Kits and Lab. materials	Daily Exams
Five	(2T+2P)	Exam.	Exam.	PowerPoint	
Six	(2T+2P)		Taxonomy of Fungi – Kingdom 1: Protozoa	PowerPoint+ Kits and Lab. materials	Daily Exams
Seven	(2T+2P)		Kingdom 2: Straminipila –	PowerPoint+ Kits and Lab. materials	Daily Exams
Eight	(2T+2P)		Kingdom 3: Fungi – Phylum 1: Chytridiomycota, Phylum 2: Zygomycota	PowerPoint+ Kits and Lab. materials	Daily Exams
Nine	(2T+2P)		Phylum 3: Ascomycota – Classes: Archiascomycetes, Hemiascomycetes	PowerPoint+ Kits and Lab. materials	Daily Exams
Ten	(2T+2P)		Phylum 3 (continued): Ascomycota – Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes	PowerPoint+ Kits and Lab. materials	Daily Exams
Eleven	(2T+2P)		Phylum 3 (continued): Ascomycota –	PowerPoint+ Kits and	Daily Exams

			Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes	Lab. materials	
Twelve	(2T+2P)		Phylum 4: Basidiomycota – Phylum 5: Anamorphic fungi	PowerPoint+ Kits and Lab. materials	Daily Exams
Thirteen	(2T+2P)		Phylum 4: Basidiomycota – Phylum 5: Anamorphic fungi	PowerPoint+ Kits and Lab. materials	Daily Exams
Fourteen	(2T+2P)		Phylum 4: Basidiomycota – Phylum 5: Anamorphic fungi	PowerPoint+ Kits and Lab. materials	Daily Exams
Fifteen	(2T+2P)	Exam.	Exam.	PowerPoint	

10.Course Evaluation

Theoretical part	Final Exam / 34 degree	First Mid Exam. 14 degrees Second Mid Exam. 14 degrees Daily Exam. 6 degrees
Practical part	Final Exam / 16 degree	First Mid Exam. 6 degrees Second Mid Exam. 6 degrees Daily Exam. 4 degrees

11.Learning and Teaching Resources

Required textbooks (curricular books, if any)	• <i>Introductory Mycology</i> (3rd ed., 1996). Editors: Alexopoulos & Mims. • <i>Introduction to Fungi</i> (3rd ed., 2007). Editors: Webster & Weber. • <i>Fungi</i> (13th ed., 2011). Editor: Vashishta.
Main references (sources)	• <i>The Fungi</i> (2nd ed., 2001). Editors: Carlile, Watkinson, & Gooday. • <i>Description of Medical Fungi</i> (2nd

	ed., 2016). Editors: Ellis et al. • <i>Mycotoxins</i> (2008). Editor: Leslie. • <i>Fungal Biology</i> (4th ed., 2006). Jim Deacon, Blackwell Publishing.
Recommended books and references (scientific journals, reports..)	• <i>IMA Fungus – The Global Mycological Journal</i> • <i>Clinical Microbiology Reviews</i> • Countryside Fungi Resource
Electronic References, Websites	Scientific journals, reports, and research papers.