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Academic Program and Course Description Guide

2024-2025

Introduction

The academic program is viewed as an integrated and coordinated system of courses, designed and organized systematically to form a cohesive educational curriculum aimed at providing students with gradual educational, knowledge, and practical experiences. The primary goal is to develop and refine students' knowledge, skills, and professional competencies, enabling them to integrate efficiently into the labor market and respond to societal needs and sustainable development requirements. The academic program is subject to annual periodic review through internal and external audit mechanisms, such as the External Examiner Program, to ensure its quality and alignment with national and international standards. The academic program description represents a concise and objective document that includes the program's main characteristics and structure, accurately presenting the skills, knowledge, and values imparted to students. This description is directly linked to the program's mission and objectives and is a fundamental pillar for obtaining programmatic academic accreditation. Therefore, its preparation involves the collaboration of faculty members under the supervision of scientific committees in academic departments, reflecting the collective and institutional nature of the educational process. This guide, in its second edition, provides a comprehensive update to the description of academic programs, taking into account changes in the educational system in Iraq. The current guide includes a presentation of programs in their traditional formats (annual or semester systems), in addition to adopting the unified academic description model circulated by the Department of Studies, Planning, and Follow-up via letter No. 3/2906/م ت on 3/5/2023, especially for programs that have adopted the Bologna path as a basis for their structure. From this perspective, we emphasize that preparing an accurate description of academic programs and courses represents a strategic step to ensure the quality of education and achieve harmony between learning outcomes and labor market needs, as well as being a fundamental tool to support institutional and programmatic evaluation and accreditation effort.

Concepts and Terminology

Course Description: A specific summary that outlines the main characteristics of the course and the educational outcomes expected to be achieved by students upon completion. The course description is derived from the program description to ensure consistency and coherence.

Program Vision: An ambitious vision for the future of the program that defines its features as a modern, motivating, and applicable program that meets the requirements of academic and societal development.

Program Mission: A concise statement outlining the purpose of the program, its core objectives, and the activities and means to achieve them, in addition to outlining the program's future development and directions.

Program Objectives: Specific and measurable statements describing what the academic program aims to achieve within a certain period, including academic, professional, and societal dimensions.

Curriculum Structure: The set of courses that make up the program according to the adopted system (annual, semester, or Bologna path), including requirements of the ministry, university, college, and scientific department, in addition to the number of credit hours for each course.

Learning Outcomes: Each course's learning outcomes are formulated to directly contribute to achieving the program's overall objectives.

Teaching and Learning Strategies: The plans and educational methods followed by faculty members to develop learning, including classroom, practical, and field activities, to ensure the achievement of desired educational outcomes.

نموذج وصف البرنامج الأكاديمي

اسم الجامعة: جامعة ديالى

الكلية\ المعهد: العلوم

القسم العلمي: قسم التقانة الاحيائية

اسم البرنامج الاكاديمي او المهني: البكالوريوس

اسم الشهادة النهائية: بكالوريوس في التقانة الاحيائية

النظام الدراسي: الفصلي و نظام مسار بولونيا

تاريخ اعداد الوصف: 20 \ 10 \ 2024

تاريخ ملئ الملف: 20 \ 1 \ 2025

التوقيع:

اسم رئيس القسم: أ. د. علياء معن عبد الحميد

التاريخ: 2025-01-20

التوقيع:

اسم المعاون العلمي: أ. د. منذر حمزة راضي

التاريخ: 2025-01-20

دقق الملف من قبل:

شعبة ضمان الجودة و الأداء الجامعي

اسم مدير شعبة ضمان الجودة و الأداء الجامعي: أ. م. غسان صبيح محمود

التاريخ:

التوقيع:

مصادقة السيد العميد

أ.د. طه محمد حسن

1. Program Vision

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

2. Program Mission

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 mission

3. Program Objectives

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

Is the program accredited? If yes, by which accrediting body? The accreditation documents have been uploaded

5. Other external influences
No

6. Program Structure				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Enterprise Requirements	4	9	7.4%	
College Requirements	6	35	28.9 %	
Department Requirements	38	121	100%	
Summer Training	1	Pass		
Other				

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

7. Program Description

Year level	Course name		Credit hours	
		Symbol	Theoretical	Practical
Third /1St	Food Microbiology	BT301	2	2
	Animal Tissue Culture	BT409	2	2
	Mycology	BT300	2	2
	Molecular techniques	BT400	2	2
	Viruses and vaccines	BT303	2	2
	Molecular Biology 1	BT201	2	2
Third /2ed	Antibiotics	BT304	2	2
	Design of experiments	BT309	2	2
	Microbial Genetics	BT308	2	2
	Cytogenetics	BT307	2	2
	Molecular Biology 2	BT202	2	2
	Immunology	BT306	2	2
Fourth/ 1st	Bioinformatics	BT401	2	2
	Medicinal Mycology	BT410	2	2
	Enzymes	BT405	2	2
	Immunogenetics	BT404	2	2
	Industrial microbiology	BT302	2	2
Fourth/ 2ed	Plant tissue culture	BT406	2	2
	Toxicology	BT408	2	2
	Diagnostic Analysis	BT305	2	2
	Plant chemistry	BT407	2	2
	Genetic Engineering	BT403	2	2
	Research project		2	2

8. Expected learning outcomes of the program	
Knowledge	
Learning Outcomes 1	Learning Outcomes Statement 1
Skills	
Learning Outcomes 2	Learning Outcomes Statement 2
Learning Outcomes 3	Learning Outcomes Statement 3
Ethics	
Learning Outcomes 4	Learning Outcomes Statement 4
Learning Outcomes 5	Learning Outcomes Statement 5

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

10. Evaluation methods
Implemented at all stages of the program in general

11. Faculty					
Faculty Members					
Academic Rank	**Specialization**		**Special Requirements /Skills (if applicable)**	**Number of the teaching staff**	
				Staff	Lecturer
	General	Special		1	
Professor	Biology	Biotechnology		1	
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		1	
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 Lecturer	Biology	Microbiology		2	

Professional development

Orienting new faculty members

- Familiarizing the new faculty member with the university, its developmental vision, its plan toward internationalization, and its improvement programs.
- Supporting the new faculty member in adapting both practically and psychologically, while reducing anxiety that may hinder participation and integration into university activities.
- Providing opportunities for the new faculty member to build networks and establish communication with peers across different departments and colleges.
- Ensuring the new faculty member understands their administrative and legal rights and responsibilities.
- Developing the faculty member’s skills in teaching, learning, and managing the educational process.

Professional development of faculty members

- Technological development and its impact on the educational process, particularly through the integration of information and communication technologies, as well as modern teaching and learning techniques.
- Institutional development planned and overseen by a specialized unit within the university, which may include continuous training programs, workshops, seminars, visiting professors, exchange visits, and collaborative research activities.
- Organizing continuing education courses focused on teaching methods, recent advancements, and approaches to keep pace with educational innovation.
- Promoting self-development to enhance both cognitive and psychological skills
- Ensuring continuous improvement and professional development of faculty members through training programs and workshops conducted within the department, the university, and beyond.
- Encouraging faculty members to attain higher academic and administrative ranks through the promotion system.

12. Acceptance Criterion

The Department of Biotechnology operates under the regulations of the Ministry of Higher Education and Scientific Research / Central Admission Department, where graduates of secondary school (scientific branch) are nominated for admission to the department based on their graduation grades.

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

Updating academic curricula and study plans by keeping pace with global developments and utilizing modern resources to meet labor market demands, in addition to revising, improving, and diversifying teaching and learning methods.

Program Skills Outline

Year/Level	Course Name	Basic or Optional	Course Symbol	Required program Learning outcomes											
				Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Third	**Food Microbiology**	**Basic**	**BT301**	√	√	√	√	√	√	√	√	√	√	√	√
	Animal Tissue Culture	**Basic**	**BT409**	√	√	√	√	√	√	√	√	√	√	√	√
	Mycology	**Basic**	**BT300**	√	√	√	√	√	√	√	√	√	√	√	√
	Molecular techniques	**Basic**	**BT400**	√	√	√	√	√	√	√	√	√	√	√	√
	Viruses and vaccines	**Basic**	**BT303**	√	√	√	√	√	√	√	√	√	√	√	√
	Molecular Biology 1	**Basic**	**BT201**	√	√	√	√	√	√	√	√	√	√	√	√
	Antibiotics	**Basic**	**BT304**	√	√	√	√	√	√	√	√	√	√	√	√
	Design of experiments	**Basic**	**BT309**	√	√	√	√	√	√	√	√	√	√	√	√
	Microbial Genetics	**Basic**	**BT308**	√	√	√	√	√	√	√	√	√	√	√	√
	Cytogenetics	**Basic**	**BT307**	√	√	√	√	√	√	√	√	√	√	√	√
	Molecular Biology 2	**Basic**	**BT202**	√	√	√	√	√	√	√	√	√	√	√	√
	Immunology	**Basic**	**BT306**	√	√	√	√	√	√	√	√	√	√	√	√
Fourth	Bioinformatics	**Optional**	**BT401**	√	√	√	√	√	√	√	√	√	√	√	√
	Medical Mycology	**Basic**	**BT410**	√	√	√	√	√	√	√	√	√	√	√	√
	Enzymes	**Basic**	**BT404**	√	√	√	√	√	√	√	√	√	√	√	√
	Immunogenetics	**Basic**	**BT404**	√	√	√	√	√	√	√	√	√	√	√	√
	Industrial Microbiology	**Basic**	**BT302**	√	√	√	√	√	√	√	√	√	√	√	√
	Plant Tissue Culture	**Basic**	**BT406**	√	√	√	√	√	√	√	√	√	√	√	√
	Toxicology	**Optional**	**BT408**	√	√	√	√	√	√	√	√	√	√	√	√
	Diagnostic Analysis	**Basic**	**BT305**	√	√	√	√	√	√	√	√	√	√	√	√
	Plant Chemistry	**Optional**	**BT407**	√	√	√	√	√	√	√	√	√	√	√	√
	Genetic Engineering	**Optional**	**BT403**	√	√	√	√	√	√	√	√	√	√	√	√
	Research Project	**Basic**		√	√	√	√	√	√	√	√	√	√	√	√

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

THIRD LEVEL

Course Description Form

1. Course Name:
Molecular biology 1
2. Course Code:
BT201
3. Semester/Year:
Third Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
7. Course Administrator's Name (mention all, if more than one name)
Name: prof. Alyaa Maan Abdulhameed **maan.alyaa@yahoo.com**

8. Course Objectives	
Course Objectives	This course aims to understand the techniques related to genetic material, including: ➢ DNA and RNA extraction techniques ➢ DNA amplification techniques and related enzymes in prokaryotic and eukaryotic cells ➢ Detection techniques using spectroscopy and nanodrop ➢ Synthesis and construction of RNA (all three types) and proteins associated with nucleic acids ➢ Protein synthesis and translation techniques in prokaryotic and eukaryotic cells ➢ Gene techniques, gene expression, and regulation of protein synthesis
9. Teaching and Learning Strategies	
Strategy	➢ Molecular Biology and Interdisciplinary Connections ➢ DNA and RNA Structure and Biosynthesis ➢ DNA Replication and Enzymology in Eukaryotes and Prokaryotes ➢ RNA Transcription: Initiation, Elongation, and Termination ➢ RNA Synthesis and Function: mRNA, tRNA, and rRNA ➢ Protein Structure, Function, and Nucleic Acid Interactions ➢ Protein Biosynthesis: Translation and Regulation ➢ Gene Expression and Regulation: Transcriptional and Post-transcriptional Control

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name		Evaluation Method
1.	2n + 2p		Identify the equipment used in the laboratory and how to use it	+ PowerPoint seminars	**Learning Method**

2.	2n + 2p		Learn about methods for preparing molar and standard solutions	+ PowerPoint seminars	Daily exams
3.	2n + 2p		Preparation of genomic DNA from prokaryotic cells	+ PowerPoint seminars	Daily exams
4.	2n + 2p		Preparation of genomic DNA from eukaryotic cells	+ PowerPoint seminars	Daily exams
5.	2n + 2p		Exam.		Daily exams
6.	2n + 2p		Electrophoresis of DNA extracted from experiments on agarose gels and measurement of molecular weight	+ PowerPoint seminars	
7.	2n + 2p		Study of DNA properties such as purity and absorption spectrum	+ PowerPoint seminars	Daily exams
8.	2n + 2p		The effect of some factors on DNA stability	+ PowerPoint seminars	Daily exams
9.	2n + 2p		Preparation of RNA from yeast	+ PowerPoint seminars	Daily exams
10.	2n + 2p		Migration of RNA on an agarose gel	+ PowerPoint seminars	Daily exams
11.	2n + 2p		Protein extraction and purification from eukaryotic and prokaryotic cells	+ PowerPoint seminars	Daily exams
12.	2n + 2p		Migration of proteins on a polyacrylamide gel	+ PowerPoint seminars	Daily exams
13.	2n + 2p		Electrophoresis of DNA extracted from experiments on agarose gels and measurement of molecular weight	+ PowerPoint seminars	Daily exams
14.	2n + 2p			+ PowerPoint seminars	Daily exams
15.			**Exam.**		

11. Course Evaluation		
The theoretical part	Final exam / 34 marks	Pursuit score / 14 first semester exam marks marks for the second semester 14 exam grades daily exams 6
practical part	Final exam/16 marks	Pursuit grade / 6 first semester exam grade marks for the second semester 6 exam daily exam grades 4

12. Learning and Teaching Resources	
Required Textbooks (curricular books, if any)	
Main References (sources)	**Diagnostic Molecular Biology**
Recommended Books and References (scientific journals, reports ... etc.)	**Molecular diagnostics**
Electronic References (websites … etc.)	**https://sigmaearth.com/ar/عامة-نظرة على-البيولوجيا-الجزيئية /**

Course Description Form

1. Course Name:	**Food microbiology**
2. Course Code:	
BT301	
3. Semester/Year:2024-2025	
Semester second	
4. Description Preparation Date:	
1/9/2024	
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: Zainab amer hatem Email: zainabamer@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	1- developing an understanding of how microorganisms impact food safety and quality, learning to identify pathogenic, spoilage, and beneficial microbes, and mastering methods for food preservation, spoilage control, and foodborne disease prevention. **2-** Students also aim to understand the factors affecting microbial growth in food, apply this knowledge to practical industry problems, and learn to use both beneficial and harmful microorganisms in food production and fermentation processes
9. Teaching and Learning Strategies	
Strategy	1- combine traditional methods like lectures and practical labs with engaging activities such as agar art, case studies of foodborne illness, and research projects **2-** Active learning, problem-solving, group discussions, and incorporating technology like inverted classrooms can enhance understanding of microbiology and safety principles, moving beyond passive learning to promote deeper engagement and critical thinking in students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Introduction to Food Microbiology	PowerPoint+ educational video + lecture PDF	Daily exam

2	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Important Microorganisms in food	PowerPoint+ educational video + lecture PDF	Daily exam
3	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Intrinsic and Extrinsic Parameters of Food Effecting on MicrobialGgrowth	PowerPoint+ educational video + lecture PDF	Daily exam
4	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Food Spoilage and Preservation	PowerPoint+ educational video + lecture PDF	Daily exam
5	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Food Preservation by High-Temperature	PowerPoint+ educational video + lecture PDF	Daily exam
6	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Preservation of Foods by Radiation	PowerPoint+ educational video + lecture PDF	Daily exam
7	(2T+2P)		Exam	Exam	
8	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Preservation of Foods with Antimicrobials	PowerPoint+ educational video + lecture PDF	Daily exam
9	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Spoilage of Specific Food Groups: milk	PowerPoint+ educational video + lecture PDF	Daily exam
10	(2T+2P)	Understanding the theortical and practical	Spoilage of Specific Food Groups: meat	PowerPoint+ educational video + lecture PDF	Daily exam

		principles and foundations releated to subjects			
11	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Microbial Enzymes	PowerPoint+ educational video + lecture PDF	Daily exam
12	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Enzymes in Food Processing	PowerPoint+ educational video + lecture PDF	Daily exam
13	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Food borne diseases and intoxications	PowerPoint+ educational video + lecture PDF	Daily exam
14	(2T+2P)		Food borne diseases and intoxications	PowerPoint+ educational video + lecture PDF	Daily exam
15	(2T+2P)		Exam	Exam	

11. Course Evaluation	
• Midterm Examination Tests understanding of fundamental concepts and principles of food microbiology . • Laboratory Work / Practical Reports Assessment of hands-on skills, safety practices, and data interpretation. • Assignments / Case Studies / Presentations Evaluates critical thinking, application of food microbiology 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)	Food Microbiology. Fundamentals and Frontiers. M.P. Doyle, L.R. Beuchat and T.J. Montville, eds., ASM Press, Washington, DC. 1997 (or 2001).
Main References (sources)	Modern Food Microbiology. Seventh Edition. J.M. Jay. Aspen Publishers, Inc., Gaithersburg, Maryland 2005. .3 Food Microbiology: An Introduction. T.J. Montville and K.R. Matthews (any edition) ASM Press, Washington, DC.2005
Recommended Books and References (scientific journals, reports ... etc.)	journal of food safety .2 journal of food protection .3 journal of food science
Electronic References (websites … etc.)	

Course Description Form

1. Course Name: **Animal Tissue Culture**

2. Course Code:

BT409

3. Semester / Year:

Semester

4. Description Preparation Date:

22 / 4/ 2024

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)

Name: Assistance lecture Massar Hadi Ismail
Email: Masarhadi@uodiyala.edu.iq

8. Course Objectives

Course Objectives	
Animal tissue culture is considered one of the modern tools for studying animal biology from multiple aspects. The course introduces students to the techniques of culturing living cells and demonstrates how cells can be cultivated in the laboratory from different biological sources. These cultured cells may be primary cells or continuous cell lines. The purpose is to develop students' understanding of cell culture techniques, their physiological activity, and how they respond under controlled laboratory conditions.	
Strategy	*The graduate must be able to know and understand all of the following:* • Develop students' receptiveness and attention to scientific content. • Enhance students' ability to respond and engage with laboratory tasks. • Encourage valuing scientific practices and assigning importance to knowledge. • Improve organizational abilities in handling laboratory work. • Promote personal responsibility and ethical conduct in research.

1. Course Structure

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

First	*(2T+2P)*		Introduction to animal tissue culture	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Second	*(2T+2P)*		The Biology of Cell Culture	=	=
Third	*(2T+2P)*		Cell Proliferation and Cell Cycle	=	=
Four	*(2T+2P)*		Cell Signaling and Cell Differentiation	=	=
Five	*(2T+2P)*	*Exam.*	*Exam.*	=	=
Six	*(2T+2P)*		Origin of Cultured Cells	=	=
Seven	*(2T+2P)*		Tissue Culture Media Requirements	=	=
Eight	*(2T+2P)*		Complete and Serum-Free Media	=	=
Nine	*(2T+2P)*		Primary Culture	=	=
Ten	*(2T+2P)*		Subculture and Propagation	=	=
Eleven	*(2T+2P)*		Transformation and Immortalization (Tumor Cell Lines)	=	=
Twelve	*(2T+2P)*		Contamination in Cell Culture	=	=
Thirteen	*(2T+2P)*		Quantitation and Cytotoxicity	=	=
Fourteen	*(2T+2P)*		Culture of Tumor Cells and Organ Culture (3D Culture)	=	=
Fifteen	*(2T+2P)*	*Exam.*	*Exam.*		

2. Course Evaluation

3. Learning and Teaching Resources

Required textbo (curricular books, if a	• Verma, A., Verma, M., & Singh, A. (2020). *Animal tissue culture principles and applications*. In **Animal Biotechnology** (pp. 269–293). Academic Press. Uysal, O., Sevimli, T., Sevimli, M., Gunes, S., & Sariboyaci, A. E. (2018). *Cell and tissue culture: The base of biotechnology*. In **Omics Technologies and Bio-Engineering** (pp. 391–429). Academic Press.
Main referen (sources)	
Recommended books	
Electronic Referenc Websites	Scientific journals, reports, and research papers.

Course Description Form

1. Course Name:

Mycology

2. Course Code:

BT300

3. Semester / Year:

Semester

4. Description Preparation Date:

22 / 4/ 2024

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)

Name: Najwan Kaleil Ibrahim | Ph.D. in Biology | Lecturer
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.

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.

9. Course Structure

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

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 – **Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes**	PowerPoint+ Kits and Lab. materials	Daily Exams
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)	• *Introductory Mycology* (3rd ed., 1996). Editors: Alexopoulos & Mims. • *Introduction to Fungi* (3rd ed., 2007). Editors: Webster & Weber. • *Fungi* (13th ed., 2011). Editor: Vashishta.
Main references (sources)	• *The Fungi* (2nd ed., 2001). Editors: Carlile, Watkinson, & Gooday. • *Description of Medical Fungi* (2nd ed., 2016). Editors: Ellis et al. • *Mycotoxins* (2008). Editor: Leslie. • *Fungal Biology* (4th ed., 2006). Jim Deacon, Blackwell Publishing.
Recommended books and references (scientific journals, reports..)	• *IMA Fungus – The Global Mycological Journal* • *Clinical Microbiology Reviews* • Countryside Fungi Resource
Electronic References, Websites	Scientific journals, reports, and resea papers.

Course Description Form

1. Course Name:
Molecular Techniques
2. Course Code:
BT408
3. Semester/Year:
Third Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
7. Course Administrator's Name (mention all, if more than one name)
Name: Assist. Lecture Abeer Mahdi Jabbar Email: abeermahdi@uodiyala.edu.iq
8. Course Objectives

Course Objectives	➢ This course aims to understand the techniques related to genetic material, including: ➢ DNA and RNA extraction techniques ➢ DNA amplification techniques and related enzymes in prokaryotic and eukaryotic cells ➢ Detection techniques using spectroscopy and nanodrop ➢ Synthesis and construction of RNA (all three types) and proteins associated with nucleic acids ➢ Protein synthesis and translation techniques in prokaryotic and eukaryotic cells ➢ Gene techniques, gene expression, and regulation of protein synthesis

9. Teaching and Learning Strategies	
Strategy	Graduates will demonstrate understanding of: ➢ Core concepts of molecular biology techniques ➢ DNA extraction methods ➢ RNA extraction and types ➢ Plasmid isolation ➢ Nucleic acid detection methods ➢ Electrophoresis techniques ➢ Cloning principles ➢ Genetic material transfer techniques between organisms

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
16.	2n + 2p		Identify the equipment used in the laboratory and how to use it	PowerPoint + seminars	**Daily exam**

17.	2n + 2p		Preparation of genomic DNA from prokaryotic cells	PowerPoint + seminars	Daily exams
18.	2n + 2p		Preparation of genomic DNA from eukaryotic cells	PowerPoint + seminars	Daily exams
19.	2n + 2p		Measurement of purity and concenteration by spectrophotometer and nanodrop	PowerPoint + seminars	Daily exams
20.	2n + 2p		Exam	PowerPoint + seminars	Daily exams
21.	2n + 2p		Electrophoresis of DNA extracted from experiments on agarose gels and measurement of molecular weight	PowerPoint + seminars	
22.	2n + 2p		Study of RNA properties such as purity and absorption spectrum	PowerPoint + seminars	Daily exams
23.	2n + 2p		The effect of some factors on DNA stability	PowerPoint + seminars	Daily exams
24.	2n + 2p		plasmid extraction	PowerPoint + seminars	Daily exams
25.	2n + 2p		DNA Cloning	PowerPoint + seminars	Daily exams
26.	2n + 2p		Genetic material transfer	PowerPoint + seminars	Daily exams
27.	2n + 2p		southern blot	PowerPoint + seminars	Daily exams
28.	2n + 2p		Northren blot	PowerPoint + seminars	Daily exams
29.	2n + 2p		Western blot	PowerPoint + seminars	Daily exams
30.			**Exam.**		

11. Course Evaluation

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	
Main References (sources)	**Diagnostic Molecular Biology**
Recommended Books and References (scientific journals, reports ... etc.)	**Molecular diagnostics**
Electronic References (websites … etc.)	**https://sigmaearth.com/ar/نظرة-عامة-على-البيولوجيا-الجزيئية /**

Course Description Form

1. Course Name:
Virology and Vaccines
2. Course Code:
BT303
3. Semester/Year:
Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
7. Course Administrator's Name (mention all, if more than one name)
Name: Hiba Ali Hilal Ahmed | MSC. in Biology | Lecturer Email: Hiba.a@uodiyala.edu.iq

8. Course Objectives

Course Objectives	➢ Introduce students to the history, origin, and development of virology. ➢ Provide knowledge about different types of viruses and factors determining viral infection. ➢ Study viral diseases. ➢ Familiarize students with antigens, antibodies, and immune responses. ➢ Introduce different types of vaccines and their immunological roles.

9. Teaching and Learning Strategies

Strategy	➢ Develop students' knowledge and understanding of microbiology and virology. ➢ Enhance comprehension skills: interpretation, prediction, and conclusion. ➢ Strengthen applied skills in connecting theory to practical virology. ➢ Improve analytical skills to examine viral problems. ➢ Encourage synthesis and creativity in designing scientific solutions. ➢ Improve evaluation skills to assess virological data and results.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Evaluation Method	Learning Method
31.	2n + 2p		**History & Origin of Virology**	PowerPoint + seminars	Daily exams

32.	2n + 2p		Virus Replication and Gene Expression	PowerPoint + seminars	Daily exams
33.	2n + 2p		**Virus Strategies and Mechanisms of Infection**	PowerPoint + seminars	Daily exams
34.	2n + 2p		Viral Pathogenesis	PowerPoint + seminars	Daily exams
35.	2n + 2p		**Exam.**	PowerPoint + seminars	Daily exams
36.	2n + 2p		Viral Immunology	PowerPoint + seminars	
37.	2n + 2p		Epidemiology of Viral Infections	PowerPoint + seminars	Daily exams
38.	2n + 2p		Viral Transformation and Oncogenesis	PowerPoint + seminars	Daily exams
39.	2n + 2p		Virus Evolution and Emergence of New Viruses	PowerPoint + seminars	Daily exams
40.	2n + 2p		**Herpesviruses** – HSV-1, HSV-2, CMV, VZV, EBV, HHV-6 to 8.	PowerPoint + seminars	Daily exams
41.	2n + 2p		Human Papillomavirus	PowerPoint + seminars	Daily exams
42.	2n + 2p		Hepadnaviruses	PowerPoint + seminars	Daily exams
43.	2n + 2p		Retroviruses, HIV, and Lentiviruses	PowerPoint + seminars	Daily exams
44.	2n + 2p		Paramyxoviruses and Orthomyxoviruses	PowerPoint + seminars	Daily exams
45.			**Exam.**		

11. Course Evaluation

The theoretical part	Final exam / 34 marks	Pursuit score / 14 first semester exam marks marks for the second semester 14 exam grades daily exams 6
Practical part	Final exam/16 marks	Pursuit grade / 6 first semester exam grade marks for the second semester 6 exam daily exam grades 4

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	*Introduction to Virology, Molecular Virology*
Main References	Journal of Immunology, Journal of Clinical Immunology, American Journal of Immunology, European Journal of Virology.
Recommended Books and References (scientific journals, reports ... etc.)	
Electronic References (websites … etc.)	

Course Description Form

1. Course Name:
Antibiotics
2. Course Code:
BT304
3. Semester/Year: Second semester 2024-2025
Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
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: Zainab Amer Hatem Email: zainab amer@uodiyala.edu.iq

8. Course Objectives	
Course Objectives	1-focus on their biology, chemistry, modes of action, classification, and the rising threat of antibiotic resistance. 2-The course addresses fundamental questions and problems concerning antibiotics. What is the role of antibiotics in nature? How are they synthesized? What are their modes of action? How can new antibiotics be discovered 3-understand Master antibiotic mechanisms, classifications, and clinical applications through pharmacology-focused content for healthcare students and professionals.

9. Teaching and Learning Strategies	
Strategy	1-emphasize responsible use and include active learning methods like interactive workshops 2-roblem-solving activities, and games to engage healthcare professionals and the public. 3-Seminars and Student Presentations – to enhance communication skills and deepen understanding by reviewing antibiotics research articles and emerging issues

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	(2T+2P)	Understanding the theortical and practical principles and foundations releated to subjects	Introduction to Antimicrobial and Drug Therapy	PowerPoint+ educational video + lecture PDF	Daily exam

2	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Sources, Mechanism of action of Antibiotics	PowerPoint+ educational video + lecture PDF	Daily exam
3	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Microorganisms Producing Antibiotics	PowerPoint+ educational video + lecture PDF	Daily exam
4	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Properties Of Antimicrobial Agents	PowerPoint+ educational video + lecture PDF	Daily exam
5	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Mechanism Of Action Of Antibiotics	PowerPoint+ educational video + lecture PDF	Daily exam
6	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Antimicrobial Drugs For Systemic Administration Penicillins, Cephalosporins, and Other β-Lactam Antibiotics	PowerPoint+ educational video + lecture PDF	Daily exam
7	(2T+2P	exam	exam	powerpoint	
8	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Pharmacology Of Antibiotics	PowerPoint+ educational video + lecture PDF	Daily exam
9	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Antibiotic Pharmacokinetics	PowerPoint+ educational video + lecture PDF	Daily exam
10	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Antimicrobial Drugs For Systemic Administration Tetracyclines , Chloramphenicol , Macrolides , Aminoglycosides, Quinolones	PowerPoint+ educational video + lecture PDF	Daily exam
11	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Mechanism Of Resistance To Antibiotics	PowerPoint+ educational video + lecture PDF	Daily exam
12	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Multidrug Resistance	PowerPoint+ educational video + lecture PDF	Daily exam
13	(2T+2P	Understanding the theortical and practical principles	Antibiotic production	PowerPoint+ educational video + lecture PDF	Daily exam

14	(2T+2P	Understanding the theortical and practical principles and foundations releated to subjects	Antimetabolites, Toxicity of Antibiotics	PowerPoint+ educational video + lecture PDF	Daily exam
15	2T+2P	exam	exam	PowerPoint	

11. 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	

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	
Main References (sources)	Walsh, C. (2003). Antibiotics: actions, origins, resistance. American Society for Microbiology (ASM). Bhattacharjee, M. K. (2016). Chemistry of antibiotics and related drugs (Vol. 219). Cham: Springer.
Recommended Books and References (scientific journals, reports ... etc.)	
Electronic References (websites … etc.)	America's Health Insurance Plans, 2019. How Big Pharma Makes Big Profits on Orphan Drugs. [Online] Available at: https://orphandrug.ahip.org/ [Accessed 9 February 2022].

Course Description Form

1. Course Name:
Experimental Design
2. Course Code:
BT309
3. Semester/Year:
Third Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
7. Course Administrator's Name (mention all, if more than one name)
Name: Professor Dr. Alyaa Maan Abdalhamed Email: alyaa.maen@uodiyala.edu.iq

8. Course Objectives

Course Objectives	By the end of this course, students will be able to: • Understand the fundamental concepts of experimental design and its practical applications. • Distinguish between various types of experimental designs and select the appropriate one for specific research questions. • Recognize the differences between pre-experimental, true-experimental, and quasi-experimental designs. • Develop and implement experimental plans, including consideration of ethical and practical constraints. • Communicate experimental results effectively using academic writing principles and techniques.

9. Teaching and Learning Strategies

Strategy	• Demonstrate knowledge of theoretical and practical principles relevant to experimental design in scientific research. • Understand scientific methodology, research problem-solving, and the application of appropriate experimental approaches. • Recognize the importance of scientific theories and their relevance to various scientific disciplines. • Become familiar with key scientific and technical terminology related to experimental design and writing. • Apply experimental design methods to diverse scientific problems.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Evaluation Method	Learning Method
46.	2n + 2p		Principles of Experimental Design	PowerPoint +seminars	

47.	2n + 2p		Principles of Experimental Design	PowerPoint +seminars	Daily exams
48.	2n + 2p		How to Choose the Appropriate Research Method	PowerPoint +seminars	Daily exams
49.	2n + 2p		Common Mistakes in Experimental Design	PowerPoint +seminars	Daily exams
50.	2n + 2p		**Exam.**	PowerPoint +seminars	Daily exams
51.	2n + 2p		Methods of Data Analysis	PowerPoint +seminars	
52.	2n + 2p		Methods of Data Analysis	PowerPoint +seminars	Daily exams
53.	2n + 2p		Introduction to Academic Writing	PowerPoint +seminars	Daily exams
54.	2n + 2p		Principles of Academic Writing	PowerPoint +seminars	Daily exams
55.	2n + 2p		Developing Your Writing Style	PowerPoint +seminars	Daily exams
56.	2n + 2p		Developing Your Writing Style	PowerPoint +seminars	Daily exams
57.	2n + 2p		Writing Results and Discussion Sections	PowerPoint +seminars	Daily exams
58.	2n + 2p		Writing Results and Discussion Sections	PowerPoint +seminars	Daily exams
59.	2n + 2p		Writing Results and Discussion Sections	PowerPoint +seminars	Daily exams
60.	2n + 2p		**Exam.**		

11. Course Evaluation

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	**Raimes, A. (1983)** – *Techniques in Teaching Writing.* Oxford University Press.
Main References (sources)	**MacArthur, C.A., Graham, S., & Fitzgerald, J. (2008)** – *Handbook of Writing Research.* Guilford Press.
Recommended Books and References (scientific journals, reports ... etc.)	**Jakobs, E.M., & Perrin, D. (2014)** – *Handbook of Writing and Text Production.* Walter de Gruyter GmbH & Co KG.
Electronic References (websites … etc.)	

Course Description Form

1. Course Name:
Molecular biology 2
2. Course Code:
BT202
3. Semester/Year:
Third Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
7. Course Administrator's Name (mention all, if more than one name)
Name: Prof. Alyaa Maan Abdulhameed **maan.alyaa@yahoo.com**

8. Course Objectives	
Course Objectives	This course aims to understand the techniques related to genetic material, including: DNA and RNA extraction techniques DNA amplification techniques and related enzymes in prokaryotic and eukaryotic cells Detection techniques using spectroscopy and nanodrop Synthesis and construction of RNA (all three types) and proteins associated with nucleic acids Protein synthesis and translation techniques in prokaryotic and eukaryotic cells Gene techniques, gene expression, and regulation of protein synthesis

9. Teaching and Learning Strategies	
Strategy	Molecular Biology and Interdisciplinary Connections DNA and RNA Structure and Biosynthesis DNA Replication and Enzymology in Eukaryotes and Prokaryotes RNA Transcription: Initiation, Elongation, and Termination RNA Synthesis and Function: mRNA, tRNA, and rRNA Protein Structure, Function, and Nucleic Acid Interactions Protein Biosynthesis: Translation and Regulation Gene Expression and Regulation: Transcriptional and Post-transcriptional Control

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name		Evaluation Method

1.	2n + 2p		The replication type of DNA	+ PowerPoint seminars	**Learning Method**
2.	2n + 2p		The maechanism of replication of DNA in eukaryotuc cell	+ PowerPoint seminars	Daily exams
3.	2n + 2p		Transcription of DNA	+ PowerPoint seminars	Daily exams
4.	2n + 2p		Post transcription modification of mRNA	+ PowerPoint seminars	Daily exams
5.	2n + 2p		Exam.		Daily exams
6.	2n + 2p		Translation and gene expression	+ PowerPoint seminars	
7.	2n + 2p		Post translation modificatio	+ PowerPoint seminars	Daily exams
8.	2n + 2p		Transposons	+ PowerPoint seminars	Daily exams
9.	2n + 2p		Mutation	+ PowerPoint seminars	Daily exams
10.	2n + 2p		DNA repair	+ PowerPoint seminars	Daily exams
11.	2n + 2p		Operon	+ PowerPoint seminars	Daily exams
12.	2n + 2p		Protiens	+ PowerPoint seminars	Daily exams
13.	2n + 2p		Types of Protien	+ PowerPoint seminars	Daily exams
14.	2n + 2p		Chaperone	+ PowerPoint seminars	Daily exams
15.			**Exam.**		

11. Course Evaluation		
The theoretical part	Final exam / 34 marks	Pursuit score / 14 first semester exam marks marks for the second semester 14 exam grades daily exams 6
practical part	Final exam/16 marks	Pursuit grade / 6 first semester exam grade marks for the second semester 6 exam daily exam grades 4

12. Learning and Teaching Resources	
Required Textbooks (curricular books, if any)	
Main References (sources)	**Diagnostic Molecular Biology**
Recommended Books and References (scientific journals, reports ... etc.)	**Molecular diagnostics**
Electronic References (websites … etc.)	**https://sigmaearth.com/ar/عامة-نظرة على-البيولوجيا-الجزيئية /**

Course Description Form

1. Course Name:
Cytogenetics
2. Course Code:
BT307
3. Semester/Year:
Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
7. Course Administrator's Name (mention all, if more than one name)
Name: Abeer Habeb Ahmed | MSC. in Biology | Assistant Lecturer Email: abeerhabeb@uodiyala.edu.iq

8. Course Objectives	
Course Objectives	By the end of this course, students will be able to: 1. Explain the principles of cytogenetics and the role of chromosomes in heredity. 2. Demonstrate knowledge of the cellular mechanisms governing chromosome function at the molecular level. 3. Recognize the potential applications of cytogenetics in medical, pharmaceutical, and industrial biotechnology fields.

9. Teaching and Learning Strategies	
Strategy	➢ Understand the basic principles and theoretical foundations of cytogenetics. ➢ Gain familiarity with scientific methods, research design, and problem-solving approaches in genetics. ➢ Appreciate the relevance of genetic theory to different biological and medical sciences. ➢ Learn key cytogenetic terminology and its application in scientific contexts.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	Unit or Subject Name	Learning Method	Evaluation Method
1	4		Introduction to the study of the genetics	Lecture ,demonstrations ,interactive discussion and self-education	Introduction to computer, basic definition ,interactive discussion and oral and written tests
2	4		Introduction to Cytogenetics	=	=

3	4		Heterochromatin, Euchromatin, and Nucleosome Structure	=	=
4	4		Chromosome Replication, Segregation, and Centrosome Function	=	=
5	4		Chromosome Replication, Segregation, and Centrosome Function	=	=
6			EXAM	=	=
7	4		Numerical Chromosomal Abnormalities	=	=
8	4		Structural Chromosomal Abnormalitie	=	=
9	4		Mechanisms of Structural Abnormalities	=	=
10	4		Sex Chromosomes and X-Chromosome Inactivation	=	=
11	4		Sex Chromosome Abnormalities	=	=
12	4		Sample Collection, Cell Culture, and Harvesting Techniques	=	=
13	4		Sample Collection, Cell Culture, and Harvesting Techniques	=	=
14	4		Chromosome Banding Techniques	=	=
15			Second 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)	Chowdhury, M.R., Singh, A., & Dubey, S. (2020). *Role of Cytogenetics and Molecular Genetics in Human Health and Medicine.* In *Animal Biotechnology* (pp. 481-501). Academic Press.
Main References (sources)	
Recommended Books and References (scientific journals,	
Electronic References (websites … etc.)	

Course Description Form

1. Course Name:

Microbiology Genetics

2. Course Code:

BT308

3. Semester/Year:

Semester

4. Description Preparation Date:

1/9/2024

5. Available Attendance Forms:

weekly

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

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

Name: Zainab Amer Hatem | Ph.D. in Biology | Assistant Professor
Email: Zainabamer@uodiyala.edu.iq

8. Course Objectives

Course Objectives	Upon completion of this course, students will be able to: ➢ Understand the structure and organization of microbial genetic material. ➢ Explain the different types of mutations and their biological significance. ➢ Describe the processes of conjugation, transformation, and transduction in bacteria. ➢ Comprehend the function of genetic systems in bacteria and bacteriophages. ➢ Recognize the principles of genetic regulation and gene expression. ➢ Apply the fundamental concepts of microbial genetics to modern molecular biology and biotechnology.

9. Teaching and Learning Strategies

Strategy	By the end of this course, students should: 1. Understand theoretical principles and concepts of microbial genetics. 2. Demonstrate awareness of scientific approaches, research methodologies, and experimental techniques. 3. Recognize the importance of microbial genetics in applied sciences and biotechnology. 4. Define and correctly use scientific terminology related to microbial genetics. 5. Understand methods for designing and conducting genetic experiments.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Evaluation Method	Learning Method
16.	2n + 2p		**Introduction to Genetic Microbiology**	PowerPoint + seminars	Daily exams

17.	2n + 2p		Definition of Genetics	PowerPoint + seminars	Daily exams
18.	2n + 2p		Gene Types and Structures	PowerPoint + seminars	Daily exams
19.	2n + 2p		Genome Organization	PowerPoint + seminars	Daily exams
20.	2n + 2p		**Exam.**	PowerPoint + seminars	Daily exams
21.	2n + 2p		Genetic Code	PowerPoint + seminars	
22.	2n + 2p		Gene Expression	PowerPoint + seminars	Daily exams
23.	2n + 2p		Regulation of Gene Transcription	PowerPoint + seminars	Daily exams
24.	2n + 2p		Vectors and Their Types	PowerPoint + seminars	Daily exams
25.	2n + 2p		Types of Clones	PowerPoint + seminars	Daily exams
26.	2n + 2p		Gene Transfer – Conjugation, Transformation, Transduction	PowerPoint + seminars	Daily exams
27.	2n + 2p		Gene Transfer – Conjugation, Transformation, Transduction	PowerPoint + seminars	Daily exams
28.	2n + 2p		Genotypes and Phenotypes	PowerPoint + seminars	Daily exams
29.	2n + 2p		Regulatory mRNA Sequences	PowerPoint + seminars	Daily exams
30.			**Exam.**		

11. Course Evaluation

The theoretical part	Final exam / 34 marks	Pursuit score / 14 first semester exam marks marks for the second semester 14 exam grades daily exams 6
Practical part	Final exam/16 marks	Pursuit grade / 6 first semester exam grade marks for the second semester 6 exam daily exam grades 4

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	
Main References	
Recommended Books and References (scientific journals, reports ... etc.)	Nature – Microbial Genetics
Electronic References (websites … etc.)	

Course Description Form

1. Course Name:
Immunology
2. Course Code:
BT306
3. Semester/Year:
Semester
4. Description Preparation Date:
1/9/2024
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: hahad khaleel ibrahem | Ph.D. in Biology | Lecturer Email: Shahadkhaleel@uodiyala.edu.iq

8. Course Objectives	
Course Objectives	1. Learn about the history, fields and development of immunology 2. As well as knowing the types of immunity and what are the factors that determine immunity 3. As well as studying immune cells, how these cells work, identifying lymphoid organs, and what are the types of immune response 4. And identifying antibodies and antigens and their interaction 7a and identifying the types of allergic reactions and their harms 5. As well as knowing the role of the histocompatibility complex and its importance from the immunological point of view **6.** Learn about the most important immune interactions between cells and the role of chemicals produced by some immune cells.
9. Teaching and Learning Strategies	
Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students**.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	4		Definition of Immunity and Immune system. Historical Background of Immunolog	Lecture ,demonstrations ,interactive discussion and self-education	computer, basic definition ,interactive discussion and oral and written tests

2	4		Innate host defenses, Anatomical barriers against infections, Humoral barriers against infections, Cellular barriers against infections:	=	=
3	4		Characteristics of non-specific (Innate), Granulocytes:- polymorphonuclear cells	=	=
			Non- granulated cells Monocyte Lymphocytes		
4	4		Characteristics of Acquired Immunity Classification of adaptive immunity	=	=
5	4		Lymph nodes Spleen	=	=
6	4		Mechanisms of IR Primary IR Secondary IR	=	=
7	4		Properties of Immunogen Haptens Adjuvant	=	=
8	4		Structure of Ab Classes of Ab	=	=
9	4		Consequences of Antigen-Antibody Binding Properties of Ag-Ab reaction	=	=
10	4		Pathways of Complement activation	=	=
11	4		Organ specific autoimmune diseases Non -Organ specific autoimmune diseases	=	=
12	4		Central and peripheral tolerance	=	=
13	4		Types of Immune-deficiency Factors cause immune deficiency	=	=
14	4		Immune cell with antitumor activity Tumor associated antigens Immunotherapy	=	=
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)	Doan, Thao, et al. *Immunology*. Lippincott Williams & Wilkins, 2012.
Main References (sources)	Buxton, B. A., Jensen, L. A., & Gregg, R. K. (2009). *Lippincott's illustrated Q&A review of microbiology and immunology*. Lippincott Williams & Wilkins.
Recommended Books and References (scientific journals, reports ... etc.)	Rich, R. R., Fleisher, T. A., Shearer, W. T., Schroeder Jr, H. W., Frew, A. J., & Weyand, C. M. (2012). *Clinical immunology e-book: principles and practice*. Elsevier Health Sciences.

1. Course Name:

Mycology

2. Course Code:

BT300

3. Semester / Year:

Semester

4. Description Preparation Date:

22 / 4/ 2024

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)

Name:: Najwan Kaleil Ibrahim | Ph.D. in Biology | Lecturer
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.

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.

4. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
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 – **Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
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*	

5. 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

6. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• *Introductory Mycology* (3rd ed., 1996). Editors: Alexopoulos & Mims. • *Introduction to Fungi* (3rd ed., 2007). Editors: Webster & Weber. • *Fungi* (13th ed., 2011). Editor: Vashishta.
Main references (sources)	• *The Fungi* (2nd ed., 2001). Editors: Carlile, Watkinson, & Gooday. • *Description of Medical Fungi* (2nd ed., 2016). Editors: Ellis et al. • *Mycotoxins* (2008). Editor: Leslie. • *Fungal Biology* (4th ed., 2006). Jim Deacon, Blackwell Publishing.
Recommended books and references (scientific journals, reports..)	• *IMA Fungus – The Global Mycological Journal* • *Clinical Microbiology Reviews* • Countryside Fungi Resource
Electronic References, Websites	Scientific journals, reports, and resea papers.

FOURTH LEVEL

Course Description Form

1. Course Name:	**Bioinformatics**
2. Course Code:	
BT401	
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
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)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Department of Biotechnology, College of Science, University of Diyala Email: biotech@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). *Introduction to Bioinformatics*. Oxford University Press. • Baxevanis, A.D., Bader, G.D., & Wishart, D.S. (2020). *Bioinformatics*. John Wiley & Sons.
Main References (sources)	- *Bioinformatics* (Oxford Academic Journal) - *Briefings in Bioinformatics* - *Nucleic Acids Research (NAR)*
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:	
BT405	
3. Semester/Year:	
Semester	
4. Description Preparation Date:	
1/9/2024	
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: Department of Biotechnology, College of Science, University of Diyala Email: biotech@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:	
1/9/2024	
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)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Department of Biotechnology, College of Science, University of Diyala Email: biotech@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: history, scope, development	Lectures, seminars	Oral and 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 signaling	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 / First Semester	
4. Description Preparation Date:	
1/9/2024	
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)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Zainab Abd Mohamed | Ph.D. in Biology | Lecturer Email: Zainababed@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 microorganisms	Lecture, lab	Oral and written exam
2	4 hrs	Sterility in industrial microbiology	Lecture, lab	Report
3	4 hrs	Maintenance and preservation of	Lecture, lab	Quiz

		industrial strains		
4	4 hrs	Isolation of *Bacillus* 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 *Aspergillus niger* (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). *Modern Industrial Microbiology and Biotechnology*. CRC Press. • Waites, M.J., Morgan, N.L., Rockey, J.S., & Higton, G. (2002). *Industrial Microbiology: An Introduction*. 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 ... etc.)	• Food and Industrial Microbiology journals • Bioprocess Engineering references
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:
BT406
3. Semester / Year:
Semester program / 2023 – 2024
4. Description Preparation Date:
22 4/ 2024
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	

7. Teaching and Learning Strategies *Explaining the basic principles of tissue culture
8. *Clarification of methods for establishing a tissue culture laboratory.
9. *Study of types of plant hormones
10. *Study of types of sterilizers
11. *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

12. 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 hormons	Type of plant hormons	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 Lab.	Daily Exams

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

13.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

14.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:	**BT408**
3. Semester/Year:	**2024- 2025**
Semester	**second**
4. Description Preparation Date:	
1/9/2024	
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: Email:	Dr. Najwan Abbas Mohammed 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 Toxikinetics	=	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 *Health effects, toxicological profiles, and case studies of hazardous substances.* **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:	**BT305**
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
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)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Hiba Ali Hilal Ahmed | MSC. in Biology | Lecturer Email: Hiba.a@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:
BT307
3. Semester/Year:
Semester
4. Description Preparation Date:
1/9/2024
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	Required	Unit or Subject Name	Learning	Evaluation

	s	Learning Outcomes		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.** *Medicinal Plants: Chemistry and Properties.* 1st Edition. Textbook of Plant Chemistry (2011).
Main References (sources)	
Recommended Books and References (scientific journals, reports ... etc.)	
Electronic References (websites … etc.)	

1. Course Name:	**Genetic Engineering**
2. Course Code:	**BT403**
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
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)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Dr. Nasser 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.
9. Teaching and Learning Strategies	
Strategy	• Lectures with PowerPoint presentations. • Practical laboratory sessions. • Seminars, group discussions, and assignments. • Student presentations and reports.

10. Course Structure

Week	Hours	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). *Genetic Engineering: Cloning DNA*. Springer Science & Business Media. • Kurnaz, I. A. (2015). *Techniques in Genetic Engineering*. CRC Press.
Main References (sources)	• *Journal of Genetic Engineering and Biotechnology* • *Nature Reviews Genetics* • *Trends in Biotechnology*
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:	
BT410	
3. Semester / Year:	
Semester program / 2023 – 2024	
4. Description Preparation Date:	
23 / 4/ 2024	
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. Najwan Abbas Mohammed Email: najwanabbas@gmail.com	
8. Course Objectives	
Course Objectives	** Defining the group of pathogenic fungi and dividing them into a group of sections base on their pathogenicity* *It also includes introducing the student to fungal diseases, their types, and the m important pathogenic fungal species that cause these diseases. It also aims to kn mycopoisoning and mycotoxins, differentiate between the two types, types of mycotox and types of fungal poisoning resulting from eating poisonous mushrooms.*
9. Teaching and Learning Strategies	
Strategy	*At the end of this year, the student must be familiar with the following techniques:* *1. General characteristics and characteristics of medicinal mushrooms.* *2. The most important medicinal fungi, their diseases, and methods of isolation and diagnosis.* *3. Developing the student's descriptive ability and acquiring the skill in diagnosing fung diseases and the most important distinctive symptoms of the disease.* *4. Introducing the student to the types of fungi and the distinctive characteristics of each and gaining the ability to diagnose them*

10. Course Structure

Week	Hours	Required Learning Outcomes	Learning method	Evaluation method

First	*(2T+2P)*	*Introduction to mycology*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*
Second	*(2T+2P)*	*Fungi as human pathogens*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*
Third	*(2T+2P)*	*Introduction to medical mycoses*	*PowerPoint+ educational video + lecture PDF*	*report*
Four	*(2T+2P)*	*General classification of mycoses*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*
Five	*(2T+2P)*	*Mycotoxin and mycotoxicoses*	*PowerPoint+ educational video + lecture PDF*	*Daily exams*
Six	*(2T+2P)*	*Superficial fungal infection*	*PowerPoint+ educational video + lecture PDF*	*report*
Seven	*(2T+2P)*	*First exam*		*Daily Exams*
Eight	*(2T+2P)*	*Cutaneous and subcutaneous mycoses*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*
Nine	*(2T+2P)*	*Systemic mycoses*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*
Ten	*(2T+2P)*	*Opportunistic mycoses*	*PowerPoint+ educational video + lecture PDF*	*Report*
Eleven	*(2T+2P)*	*Candidiasis*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*
Twelve	*(2T+2P)*	*Aspergilloses*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*
Thirteen	*(2T+2P)*	*Mucormycoses*	*PowerPoint+ educational video + lecture PDF*	*Daily Exams*

Fourteen	*(2T+2P)*	*Antifungals*	*PowerPoint+ educational video + lecture PDF*	*Report*
Fifteen	*(2T+2P)*	*Exam.*	*Exam*	

11.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

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Chander, J. (2017). Textbook of med mycology. JP Medical Ltd.
Recommended books and references (scientific journals, reports..)	Wickes, B. L., & Wiederhold, N. P. (20 Molecular diagnostics in medical mycol Nature communications, 9(1), 1-13. Reiss Shadomy, H. J., & Lyon, G. M. (20 Fundamental medical mycology. John W & Sons.
Electronic References, Websites	