University of Diyala
Collage of Science
Department of Biotechnolog

First Cycle

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

2026-2025

form Academic program description

University name: Diyala University

College/Institute: College of Science

Scientific Department: Department of Biotechnology

Name of the academic or professional program: Bachelor's degree Name of final degree: Bachelor of Biotechnology Study system: Bologna Process

Description preparation date: 1/95/2025

Date of filling the file: 10/9/2025





التوقيع

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التاريخ: 2025/9/10

التوقيع:

اسم المعاون العلمي: ا.د منذر حمزة

التاريخ: 2025/9/10

Check the file before

Division of Quality Assurance and University Performance

Name of the Director of the Quality Assurance and University



Ghassan Sabeeh Mahmood



Authentication of the Dean

Prof. Dr. Taha Muhammad Hassan

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1. Mission & Vision Statement

Vision Statement

Providing graduates with excellent theoretical foundation and practical skills, as well as promoting scientific research and community service. Our vision is to produce leadership students who can use biotechnological outcomes to solve problems in agriculture, industry, healthcare, and environmental restoration, resulting in human sustainable development.

Mission Statement

Biotechnology is a multidisciplinary science integrates different scientific areas such as Microbiology, Molecular Biology, Biochemistry, Genetics, Bioinformatics, Chemical engineering. Accordingly, the mission of the Department of Biotechnology is to maximize the benefits of research in biotechnology to the community of Diyala Province by being an excellent quality, comprehensive, multidisciplinary department that supports and coordinates with other Governmental Departments in the city. To provide a program for education of international standards in Biotechnology using advanced methods and techniques and establishing academic and research collaborations with the industrial, agricultural and health care sectors.

2. Program Specification

Programme code:	BSc-BIOT	**ECTS**	240
Duration:	6 Levels, 12 Semesters	**Method of Attendance:**	Full Time

Biotechnology is one of the most dynamic areas of modern biology and takes a finding solutions approach, which considers how the fundamental knowledge derived from biological sciences can be applied to industrial and medical, agricultural, environmental applications. The term biotechnology for the purpose of understanding can be divided in to two "bio" and "technology". "Bio" means the use of biological processes and "technology" means to solve problems or make useful products. Generally, biotechnology can be defined as "The use of living organisms, cells or cellular components for the production of compounds or precise genetic improvement of living things for the benefit of man".

The B.Sc. Biotechnology programme is a four-year degree programme. In the first two years, the students will receive a fundamentals core subjects then they will specialise in the third and final year, making their choice from a wide range of subjects and graduate projects. The programme courses are designed to contain topics covering all aspects of the biotechnology in order to create innovative problem solvers through theoretical and practical skills and cognitive abilities.

3. Program Objectives

The main objectives of the biotechnology programme are:

- To improve the students intellectual, personal, and professional skills to be successful in their careers.
- To develop excellent research tools and capabilities through our resource facilities.
- To catalyze the formation of and participate in cross-disciplinary research programs with industry and agriculture that use our research facilities to solve practical problems of Diyala Province.
- To increase public awareness and understanding of biotechnology and its impacts.
- To provide training activities for students and visiting researchers in biotechnology.
- To become a resource for biotechnology information and education.
- To aid other units in UOD in obtaining support for biotechnology service and research.

4. Student Learning Outcomes

Learning outcomes are statements on what successful students have achieved as the result of learning. These threshold statements of achievement are linked to the knowledge, understanding and skills that a student will have gained on successfully completing a course. After completion of the Biotechnology programme:

- Biotechnologists will be able to conduct and validate experiments to address specific problems independently using scientific methods including experiment design, data analysis and interpretation, and providing valid conclusions.

- Biotechnologist will able to apply their knowledge of Biotechnology in industry, medicine, agriculture and environmental sciences.
- Biotechnologist will have the essential technical skills required for academic research in the field of Biotechnology.
- Will have a wide range of career options in research, academia, government and private sector.
- How to think and read critically and analyze scientific literature in the field of biotechnology

5. Academic Staff

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6. Credits, Grading and GPA

Credits

University of Diyala is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester.

1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: **Pass** and **Fail**. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME				
Group	**Grade**		**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX - Fail		(45-49)	More work required but credit awarded
	F - Fail		(0-44)	Considerable amount of work required

Note:
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Calculation of the Cumulative Grade Point Average (CGPA)

The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

CGPA of a 4-year B.Sc. degree:

CGPA = [(1st ^{m}odule score x ECTS) + (2nd ^{m}odule score x ECTS) + ……] / 240

7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT-1101	Principles of Biotechnology 1	109	91	8	C	
BIOT-1102	General Biology 1	109	91	8	C	
BIOT-1103	Analytical Chemistry	94	81	7	S	
UD13	Computer skill	49	26	3	B	
UD14	Human Rights and Democracy	33	17	52	B	
UD12	Arabic Language	33	17	52	B	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT-1204	Principles of Biotechnology 2	109	91	8	C	BIOT-1101
BIOT-1205	General Biology 2	109	91	8	C	BIOT-1102
BIOT-1206	Organic Chemistry	79	46	5	S	
03B	Biophysics	79	21	4	S	
BIT-1204	Biostatistics	48	27	3	B	
UD12	English Language	33	17	2	B	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT-23013	Biochemistry 1	79	46	5	C	
BIOT-23014	General biology 1	79	46	5	C	
BIOT-24022	Animal physiology	79	46	5	C	
BIOT-23016	Envirmental microbiology	79	46	5	C	

BIOT-230117	biosafty	33	17	2	S	
UOB208	English Language 2	33	17	2	S	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT-24120	Biochemistry 2	79	46	5	C	
BIOT-24121	General microbiiology 1	79	46	5	C	
BIOT-23015	Histology and microtechnology	79	46	5	C	
BIOT-24124	Nanobiotechnologt	79	46	5	C	
	Biological control	79	46	5	C	
UOB206	Arabic Language 2	33	17	2	B	
UOB 207	Computer skill 2	49	26	3	B	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT35027	Moleculer biology	79	46	6	C	
BIOT35028	Plant biotechnology	79	46	6	C	
BIOT35029	Gene -chemobiotechnology	79	46	5	C	
BIOT35030	Pathogenic bacteria	79	46	5	C	
BIOT35031	Fermentation technology	79	46	6	C	
UOB309	Research Methodolgy	18	7	2	B	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT36033	Microbial genetic	79	91	71	C	BIOT-1101
BIOT36034	Food biotechnology	79	91	46	C	BIOT-1102
BIOT36035	Immunology	79	46	71	C	
BIOT36036	Enviromental biotechnology	79	21	46	C	
BIOT36037	Antibiotic	79	27	46	C	
BIOT35032	mycology	79	17	46	C	

8. Content

Program Manager:

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Program Coordinator:

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Semester ONE

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية					
Module Title	**Principle of Biotechnology** 1			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-1101**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGx11 1		**Semester of Delivery**	1	
Administering Department	Biotechnology		**College**	College of Science	
Module Leader	Alyaa Maan Abd Alhameed		**e-mail**	alyaa.maen@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ziyad Kalouf Radeef		**e-mail**	zeyadkh.radeef@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1- Bachelor course in biotechnology offers the synergism of basic concepts of biology, biotechnology, molecular biology, genomics, Recombinant DNA technology, microbiology, biochemistry and bioinformatics with technological applications. 2- The main objective of this degree course is to produce graduates with enhanced skills, knowledge and research aptitude to carry out higher studies, entrepreneurship or research and development in the various health, research and industrial areas. 3- Develop proficiency in application of current aspects of biotechnology, molecular biology, Recombinant DNA technology, bioinformatics and genomics. 4- Students will be able to use state of the art techniques relevant to academia and industry, generic skills and global competencies including knowledge and skills that enable the students to undertake further studies in the field of biotechnology, molecular biology, Recombinant DNA technology, genomics, microbiology, biochemistry or any other related field. 5- Imparting an education that includes communication skills, the ability to work in a team with leadership quality, devoted to societal problems with an ethical attitude.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Prepares the students for immediate entry to the workplace with sound theoretical, experimental knowledge in the area of health and pharmaceuticals, biochemicals, biofuels, environment related, food and dairy, cosmetics, biopolymers and related multidisciplinary fields. 2- Overall, the course offers basic foundation in biotechnology which enables the students to understand the concepts in biochemistry, molecular biology, microbiology, genetic engineering and related industrial technology. 3- Students will be able to design, execute, record and analyse the results of experiments in field of molecular biology, genomics, Recombinant DNA technology, biochemistry, microbiology and genetic engineering. 4- Students will be able to work effectively in a group in the classroom, laboratory, industries and fieldbased situations. 5- Become efficient in using standard operating procedures and will be well versed with the regulations for safe handling and use of chemicals as well as IPR and biosafety issues related to experiments in field of biochemistry, microbiology and genetic engineering.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Teaching/learning methods and strategies Lectures and practical classes provide the basic knowledge. A variety of coursework gives opportunities for extending knowledge and techniques. Individual and group projects

	reinforce techniques and give experience of practical applications. The programme topics are introduced by lectures but are developed fully by appropriate laboratory exercises during all parts of the programme. Students are required to work both as individuals and as part of groups.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 4 and 6
	Assignments	2	10% (10)	2, 12	LO # 3, 4 and 6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**

Week 1	Definition of the concept of biotechnologies
Week 2	Historical development of biotechnology before and after the World War
Week 3	Methods used to isolate microorganisms from the elements of the environment and types of nutritional requirements for them.
Week 4	Productive and enriching food media
Week 5	Different growth phases of bacteria and molds
Week 6	Culture media used in Biotechnological processes (Media components, optimization and sterilization)
Week 7	The effect of some factors on the growth and production of microorganisms such as heat, pH, Co2, light and some chemicals
Week 8	**Mid Exam**
Week 9	Types of tissue cultures such as meristems, callus and protoplast cultures
Week 10	Types of secondary metabolism and active compounds in the plant
Week 11	Determine the different levels in the production of biological materials such as laboratory level, experimental laboratory and industrial production
Week 12	Second exam
Week 13	Definition of industrial fermentors, materials used in their manufacture and factors affecting them
Week 14	Batch culture
Week 15	Continuous Farms

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Laboratory Equipment's
Week 2	Laboratory Equipment's (practically)
Week 3	Lab 2: Microorganism's growth requirements and culture media
Week 4	Microorganism's growth requirements and culture media(practically)
Week 5	Lab 3: The Isolation of Microorganisms from a different environments by a different techniques

Week 6	The Isolation of Microorganisms from a different environments by a different techniques(practically)
Week 7	Lab 4: Maintaining and preserving pure cultures
Week 8	Maintaining and preserving pure cultures(practically)
Week 9	Lab 5: The enumeration methods of Microorganisms
Week 10	The enumeration methods of Microorganisms(practically)

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Smith, J. E. (2009). *Biotechnology* (5th ed.). Cambridge: Cambridge University Press. • Microbiology and Biotechnology (2001) • A Text book of Biotechnology(2006)	
Recommended Texts	• Gupta, V., Sengupta, M., Prakash, J., & Tripathy, B. C. (2017). *Basic and applied aspects of biotechnology*. Springer Singapore. • Crawford, C. (2018). *Principles of biotechnology*. 1st ed. New York: Salem Press. • Patnaik, B. (2012). *Textbook of biotechnology*. New Delhi: Tata McGraw Hill Education. • Dubey, R. C. (2014). *A textbook of Biotechnology*. S. Chand Publishing. • Khan, F. A. (2020). Biotechnology fundamentals. CRC Press.	
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactor	متوسط	60 - 69	Fair but with major shortcomings

	y			
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**General Biology** 1			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐**Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-1102**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGx11 1		**Semester of Delivery**	1	
Administering Department	Biotechnology		**College**	College of Science	
Module Leader	Alyaa Maan Abd Alhameed		**e-mail**	alyaa.maen@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Shaymaa Hatem Al-Majmaie		**e-mail**	shaymaa@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		

Scientific Committee Approval Date	1/06/2025	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Finding new ways to produce enough nutritious food for a growing world population. 2. Breeding plants to tolerate the heat- and drought-stress caused by climate change. 3. Developing sustainable cropping practices to produce healthful food while protecting the environment. 4. Investigating new methods to fight plant diseases.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To study about some biology terms, biology discipline, and botany discipline, the difference between Prokaryotic and Eukaryotic cells. 2. Study the planet cell. 3. Eukaryotic cell organelles, structure, composition and functions. 4. Understand the fundamental concept of the cell cycle, Mitosis, and its various stages, Meiosis, and its different phases. 5. Mendel's Laws of Inheritance. 6. Plant Tissues types. 7. Types of Root and Stem System of the plant. 8. Absorption of mineral salts of plant. 9. Translocation of organic solutes. 10. Growth and Growth hormones.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following. 1- Introduction to the General Biology of Plant – morphology, Taxonomy, physiology, anatomy, Genetics, behavior, origin and distribution 2- Study the planet cell – cell wall, cell membrane , protoplast, phragmoplast , middle- lamella. 3- Cell Organelles – Plastid, leucoplast, chromoplast, chloroplast, stroma, etioplast, mitochondria. 4- Other Cell Organelles – Ribosomes, Endoplasmic reticulum, polysome, Golgi bodies, Lysosome, spherosome, glyoxysome, peroxisome, cytoskeleton, Microelements. 5- Microtubules - Intermediate filaments, Ergastic substances, Vacuole, Nucleus, Protoplasm .

	6- Cell cycle – Mitosis, Meiosis, M phase, cytokinesis, Cyclins and cyclin-dependent protein kinases. 7- Mendel's Laws of Inheritance – Segregation, Monohybrid cross, Genotype, Phenotype, homozygous, dominant, Trait, recessive. 8- Plant Tissues types – Meristematic Tissues, Permanent Tissues, Simple Permanent Tissues, Parenchyma, Collenchyma, Sclerenchyma, Epidermis, Complex Permanent Tissue, Xylem, Phloem . 9- Types of Root System – Adventitious Roots, Taproot Roots, Assimilatory roots, Reproductive roots, Root-thorns, Floating roots, Buttress roots, Climbing roots, Contractile roots, Stilt roots, Prop roots. 10- Stem System – Nodes, Internodes, Terminal or apical bud, Lateral or axillary bud, petiole , pedicel, leaves , flowers, Seeds, Monocots, Dicots. 11- Absorption of mineral salts of plant – Ions, Contact Exchange, Carbonic acid Exchange, active absorption, Carrier Concept, Isotopic, saturation effects specificity. 12- Mineral Nutrition of the Plant –Osmotic Pressure , Catalytic Function, Antagonistic , Balancing Function. 13- -Translocation of organic solutes –Downward Translocation, Upward Translocation, Radial Translocation, Protoplasmic Streaming, Interfacial Flow Hypothesis, Active Diffusion. . 14- -Factors Controlling Translocation –Sink Active, Photosynthesis, Turgor Pressure, Phytohormones, Plasmodesmata. 15- Respiration –Oxidation , Carbohydrate, anaerobic respiration, Metabolism. 16- Growth and Growth hormones – Auxin, Cytokinins, Sigmoid Curve, Plant Hormones.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 expandingtheir critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities thatare interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

As		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 3, 5 , 8 and 12
	Assignments	2	10% (10)	2, 12	LO # 2, 4, 6 and 9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 3, 5, 6 and 9
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to the General Biology of Plant
Week 2	Study the planet cell
Week 3	Cell Organelles
Week 4	Microtubules
Week 5	Cell cycle
Week 6	Mendel's Laws of Inheritance
Week 7	Plant Tissues types
Week 8	The Midterm Exam
Week 9	Types of Root System
Week 10	Absorption of mineral salts of plant
Week	Mineral Nutrition of the Plant

11	
Week 12	**Translocation of organic solutes**
Week 13	**Factors Controlling Translocation**
Week 15	**Respiration**
Week 16	**Growth and Growth hormones**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Introduction: Branches of botany
Week 2	Lab 2: The solutions : Types of solutions
Week 3	Lab 3: The Light microscope: Experiment: Study onion cells by microscope.
Week 4	Lab 4: Plant Cell Structure.
Week 5	Lab 5: Plant pigments.
Week 6	Lab 6: Cell Division.
Week 7	Lab 7: Mendel's Laws Examples.
Week 8	Lab 8: Plant tissue.
Week 9	Lab 9: Flower of plant.
Week 10	Lab 10: Seeds of plant.
Week 11	Lab 11: Diffusion, Osmosis and Imbibition.
Week 12	Lab 12: Transpiration.
Week 13	Lab 13: The Plant Hormones.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	Pollard, T. D., Earnshaw, W. C., Lippincott-Schwartz, J., & Johnson, G. (2022). Cell biology E-book. Elsevier HealthSciences.	Yes
Recommended Texts		
Websites	PRINCIPLES OF PLANT BIOTECHNOLOGY ICAR eCourse / 2015	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Analytical chemistry**	**Module Delivery**
Module Type	**Support**	☒ **Theory** ☐**Lecture**

Module Code	**BIOT-1103**		**☒ Lab** **☐ Tutorial** **☐ Practical** **☒ Seminar**
ECTS Credits	7		
SWL (hr/Sem)	175		
Module Level	UGx11	**Semester of Delivery**	
Administering Department	Chemistry department	**College**	College of Science
Module Leader	Mohamed Jabar Mohamed	**e-mail**	**mohammedjabbar0908@gmail.com**
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2025	**Version Number**	0.1

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents **أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية**			
Module Aims **أهداف المادة الدراسية**	This module aims to cultivate a scientifically literate generation that embraces science as a foundation for transformative change, applying scientific knowledge and methods in critical thinking, analysis, and adaptation to evolving technologies and societal needs This module will be included the main points: 1- Introduce students to the fundamental principles of volumetric analysis 2- Foster an understanding of the theoretical principles and practical applications of titration. 3- To ensure a comprehensive understanding of gravimetric analysis, calculations of gravimetric coefficients, studying the calculations of solubility product constants and determining the mathematical conditions for sediment formation. 4- Identify some instrument devices used in quantitative analysis		
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	**1. weight of substances in samples, including the preparation of solutions from solid or liquid materials.** **2. Provide students with a comprehensive knowledge of volumetric analysis, particularly titration, and its wide range of applications.** **3. Identify the types of acids, bases, ionization constants, and pH**		

	function calculations, as well as identify the acidic and basic properties of water and the ionization constant (Kw). **4. Identify the hydrolysis of salts and its calculations** **5. Familiarize students with the fundamentals of Bufer solutions and its calculations** **6. Identify the basics of gravimetric analysis** **7. Studying the calculations of the solubility product constant and knowing when sediments form mathematically.** **8. Study the characteristics of the sediment and the factors affecting the solubility of the sediment, as well as the study of the factors that affect the formation of the sedimen** **9. Understand molecular spectroscopy in terms of principles and theoretical basis.**
Indicative Contents **المحتويات الإرشادية**	Indicative content includes the following. 1- Methods for expressing the concentration of solutions 2- volumetric analysis, particularly titration, 3- Calculations of pH for acids, bases, salts and buffer solutions 4- Gravimetric analysis and calculations of the solubility product constant 5- Instrument devices used in quantitative analysis

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ **15** اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to analytical chemistry
Week 2	Solutions and classification of solutions
Week 3	Express concentrations of solutions
Week 4	Density and specific gravity of solution
Week 5	The relationship between molarity or normality with percentage Concentration
Week 6	Diluting solutions
Week 7	Solve of some Problems
Week 8	Concentration by percent
Week 9	P –functions
Week 10	Volumetric analysis
Week 11	Standard solution
Week 12	Acid –Base equilibrium
Week 13	Buffer solution
Week 14	Enthalpy
Week 15	Type of enthalpy

Week 16	Energy of bonds

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab safety
Week 2	Laboratory equipments
Week 3	Laboratory techniques:distillation,filtration,centrifugation
Week 4	Vaporization,chromatography,decantation
Week 5	Pipets and pipet pumps,
Week 6	Volumetric analysis (titration)
Week 7	Methods expressing concentration of solutions and calculations of
Week 8	Preparation of (0.1 N) NaoH solution and standardization with (0.1 N)
Week 9	Preparation of (0.1 N) HCL solution and standardization with sodium
Week 10	Determination of carbonate and bicarbonate in mixture
Week 11	Determination acidity of Vineger
Week 12	Determination of hardness of water
Week 13	Preparation and standardization of (0.1 N) AgNO3 solution
Week 14	Determination of chloride according to modified Volhard method
Week 15	Complex formation reactions

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
1	Skoog (Fundamentals of Analytical Chemistry) 9 edition (Thomson, 2014)	
2	Daniel harris (Quantitative chemical analysis) (2006)	
3	Gary D. Christian (Analytical Chemistry) 7th Ed, 2014	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية			
Module Title	**Biophysics**		**Module Delivery**
Module Type	**Support**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	**BIOT-1104**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	UGx11 1	**Semester of Delivery**	1

Administering Department	Physics Department	**College**	College of Science
Module Leader	Raghd Talal	**e-mail**	raghadtalal@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	1/06/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Teaching students the basic principles of physics. 2. Preparing specialists in the field of general physics and its practical applications, which bears the responsibility of studying the country's need for development and progress and capable of meeting the needs of the job market in state institutions and industry sectors. 3. Preparing an educated generation armed with science and adopts it as a sound basis to bring about radical changes and assign scientific knowledge and scientific methods in thinking, analysis and adaptation with the development of technologies, to keep up with the expansion of human needs. 4. Effective contribution for deepening and documenting the connection of the university with the society through the implementation of advisory counseling, training and development of teaching and administrative staff. 5. The service of preparing graduates specialized in physics who contribute to development in the country. 6. Meeting the needs of various sectors with highly qualified personals in the field of physics. 7. Encouraging the distinguished in this field to work as teaching assistants in the department to be part of the academic teaching staff in the future.
Module Learning Outcomes	1- enable students to obtain knowledge and understanding of the concept of physics.

مخرجات التعلم للمادة الدراسية	2- Enable students to obtain knowledge and understanding of the scientific laws of physics. 3- Enable students to keep pace with scientific development in all scientific fields ofphysics.
Indicative Contents المحتويات الإرشادية	This course contains a lot of vocabulary, which is a branch of physics concerne and properties of matter and energy. It includes an introduction to understanding natural phenomena, the forces and affecting their course, and the formulation of knowledge into laws that do not on aforementioned processes, but also predict the course of natural processes with gradually approach reality. The topic of general physics includes an introduction to physics, vector analysis in linear motion, circular motion, and rotational motion. Also, gravitational for torque, angular momentum, laws of motion with constant or uniform accelerate rotational motion, dynamic fluids, static fluids, particle stability, electric charge and electric potential in electrical circuits and ray optics.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	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.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

As		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formati	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 4 and 6

ve assessment	Assignments	2	10% (10)	2, 12	LO # 3, 4 and 6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 6
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	A brief summary of the vectors, scalar and vector quantities, addition of vectors, unit vector, component of vectors, dot product and cross product. With examples for all these topics.
Week 2	Motion on a straight line: Displacement, Average velocity, Instantaneous velocity, Average acceleration, and Instantaneous acceleration. With examples for all these topics.
Week 3	Application of Motion with a constant acceleration: Freely falling bodies, and Projectile of motion. With examples for all these topics.
Week 4	Understanding of forces, Newton's first law, Newton's second law, Equilibrium of a particle: Newton's third law, and mass and weight. With examples for all these topics.
Week 5	Friction force, inclined plane, Torque of force, Center of gravity of the body, Center of mass, Motion of a system of particle, and Newton's law of universal gravitation. With examples for all these topics
Week 6	Circular and Rotational motion: Motion in a circle, uniform circular motion, central or radial force,non-uniform circular motion, Central or radial acceleration, Central force, tangential acceleration, and tension in circular motion. With examples for all these topics.
Week 7	Rotational motion, angular displacement, angular velocity, and angular acceleration. With examples for all these topics.
Week 8	**Midterm exam**
Week 9	Rotational motion with a constant angular acceleration, relation between angular and linear velocity and acceleration, torque, angular acceleration, and moment of inertia. With examples for all these topics.
Week 10	Elasticity: The street and strain, elastic modulus, Hook's law, tensile and compressive stress and strain, Young's modulus, bulk stress and strain, bulk modulus, compressibility, shear stress and strain, Poisson's ratio, and force constant. With examples for all these topics.
Week 11	Static fluids: Density, specific gravity, pressure in a fluid, atmospheric pressure, pressure-depth-Pascal's law, buoyancy, Archimedes principle, and define the surface tension. With examples for all these topics.
Week 12	Dynamic fluids: Ideal fluid, the continuity equation, Bernoulli's equation, Venturi meter, and define the viscosity. With examples for all these topics.
Week	Electric charge and electric field: Conductor, insulator, and induced charges. Coulomb's law, electric field, intensity of electric field, electric potential energy, electric potential energy in a

13	uniform field, electric potential energy of two point charges, potential difference, potential gradient, equipotential surfaces, and electric potential. With examples for all these topics.
Week 14	Geometric optics: Nature and propagation of light, wave front, properties of light, types of reflection, index of refraction, laws of reflection and refraction, total internal reflection, real and apparent depth, refraction by prism.
Week 15	mirrors & lenses: Spherical mirrors, image formations, spherical aberration, types of simple lenses, converging lens, diverging lens, properties of lenses, image formation by thin lenses,

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Moment of inertia for flywheel
Week 2	Simple pendulum
Week 3	Surface tension
Week 4	Speed of sound
Week 5	Glass refractive index
Week 6	diffraction grating
Week 7	Equilibrium forces
Week 8	**Midterm exam**
Week 9	Ohm's law
Week 10	Viscosity
Week 11	Wheatstone bridge
Week 12	inclined plane
Week 13	Archimedes principle
Week 14	focal length of the lens
Week 15	standing waves

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	Fundamental of Physics (Halliady, Resnick, and Walker).	Yes
Recommended Texts		
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية		
Module Title	**Democracy and Human Right**	**Module Delivery**
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☐ **Lab**
Module	**UNI-1105**	

Code			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	UGx11 1	**Semester of Delivery**	1	
Administering Department	Biotechnology	**College**	College of Science	
Module Leader		**e-mail**		
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1- This course deals with the basic concept of human rights& democracy 2- Clarifying and training students on the most important principles of human rights and democracy. 3- Organizing discussions and presentations on the most vital and basic topics affecting community building, related to human rights and democracy.. 4- Adopting teamwork with students to develop their cognitive abilities and create a spirit of cooperation, initiative, creativity and exchange of views in an effort to build the foundations of peaceful community coexistence. 5- Providing society with conscious youth aware of the importance of its role in building society, its unity and cohesion through spreading the culture of human rights and establishing the rules of correct democracy

	6- Human rights guarantee the protection and respect of an individual's interests, even when he or she is not a majority. In a democratic climate, sustainable democratic power cannot be conceived without respecting, protecting and fulfilling human rights. Through their combined influence, they allow the individual a life based on the freedom of self-determination and collective. That is why the protection and realization of human rights truly form the basis of the democratic project.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Cognitive goals.** 1- Educate students and inform them about the importance of human rights and democracy. 2- Recognize and understand the methods of teamwork for the exchange of ideas and creative discussions 3- Developing students' performance through guidance in preparing mini-research on modern vocabulary on vital topics related to human rights and democracy. 4- Providing students with creative development abilities in modern proposals and creative developmental ideas by discussing awareness videos presented on electronic classes. 5- Developing the skills of sharing opinions and ideas and respecting others opinion. **Objective Skills :** 1- Basic knowledge in the principles of human rights and democracy. Building the innovative personality of knowledge through onlineresearch and the transfer and exchange of information. 2- Discuss the various properties about everything related to humanrights and their importance in our daily lives. 3- Identify everything related to democracy and the foundations ofthe performance of the electoral process and its importance in building the nation. 4- Identify the capacitor and inductor phasor relationship withrespect to voltage and current
Indicative Contents المحتويات الإرشادية	• Developing the student's analytical and critical skills regarding the reality and future of human rights and democracy • Training the student on the importance of active participation in aspects of public life, such as promoting respect for the principles of public human rights and active participation in political and cultural life. • Enable students to understand the importance of education and its role in spreading the culture of human rights and democracy in building a civilized society based on good governance, the most important component of which is belief in human rights, education and active participation in governance through free and fair elections

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the discussions, dialogues and group work lectures & exercises, while at the same time refining and expanding their critical thinking skills. There are many teaching and learning methods used, and the most important of these methods are: Theoretical lecture,

	discussion and dialogue, panel discussions on certain topics, theoretical student research Library and electronic activities (which helps students to reach the following results: **1-** The scientific ability to distinguish between correct information and wrong information. **2-** Ease of scientific drafting and ease of correction. **3-** Ability to memorize and guess. **4-** The ability to link concepts and principles with reality. **5-** Ability to invoke, link, interpret.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Attending lectures	1	1%	1.5	41#15 weeks
	Report	1	10% (10)	13	LO # 5, 9 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Familiarity with the concept of human rights and the definitions approaching it, discussing, dismantling and criticizing them in a scientific way in order to reach the most accurate and objective. - Definition of right , of human, of the concept ofhuman rights. Human Rights Human rights qualities, Types of human rights Categories
Week 2	The historical development of human rights: Orcagina Reforms 1- Urnamo Law.2- The law of Ishtar Bit. 3- The law of the Kingdom of Eshnuna.4- Code ofHammurabi.
Week 3	Human rights in other ancient civilizations: 1- Indian and Chinese civilization 2- 4- Roman civilization Pharaonic civilization of Egypt 3- Greek civilization
Week 4	Human rights in heavenly laws Human Rights in Judaism, Human rights in Christianity, Human Rights in Islam.
Week 5	Human rights in Renaissance - modern and contemporary societies Introducing the student to the most important UN document in the field of humanrights, which was approved and approved by the Assembly on January 10, 1948 Universal Declaration of Human Rights 1948.
Week 6	Non-governmental organizations defending human rights: Amnesty International, b. International Committee of the Red Cross. Arab Organization for Human Rights.
Week 7	Definition of the phenomenon of administrative corruption, Types of administrative corruption, Causes of administrative corruption. The repercussions of the phenomenon of administrative corruption on human rights and society. Successful treatments to combat corruption and protect society fromit.
Week 8	Introduction - Historical development of the concept of democracy, definition of democracy, freedom. The difference between freedom and democracy, The relationship between the rights and public freedoms of individuals and democracy, Islamic views in a democratic system of government , Shura and Democratic System
Week 9	Specifications and duties of the Islamic ruler reading, The era of Imam Ali "peace be upon him" to his governor over Egypt: Specifications of the Islamic ruler: First:The moral and doctrinal components of the ruler Second: The general culture of the Islamic ruler, Third: Acumen and good choice: -Fourth: Direct relationship with people: Fourth: Direct relationship with people. Duties of the Islamic ruler: First: Social Reform: Second: Achieving security and defense Third: The architecture of the country "economic development"
Week 10	Forms of democracy: (1): Direct democracy ,(2): Semi-direct democracy , (3): Parliamentary democracy (parliamentary representation)4): LiberalDemocracy (5): consociation Democracy, (6): Delegated Democracy.
Week 11	Conditions for the success of the elements and pillars of the democratic system General conditions for the success of the democratic system: 1. Respect for humanrights, 2. Political pluralism 3. Peaceful transfer of power 4. Political equality 5. Respect the principle of the majority 6. Existence of the rule of law.
Week 12	Components or elements of democracy: 1 – Citizenship 2- Political participation 3. Elections 4. MPs and Responsibility 5. Opposition 6- Separation of government and parliament 7- Constitutional legitimacy
Week 13	The concept of elections and their legal adaptation: First: The concept of electionSecond: Legal adaptation of the Election, Third: Conditions of Election, Fourth: Concepts of Elections, Fifth: Types of Electoral Systems. Assessing the DemocraticSystem, Pros and advantages of the democratic system, Disadvantages and disadvantages of the democratic system, Implementing the democratic system in

	Iraq.
Week 14	Third: Lobbyists: First: the concept and definition. Second: Types of pressure groups. Themethods of pressure groups that they use to achieve their goals. Fourth: Lobbying and Democracy.
Week 15	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Martyrdom verses from the Holy Quran Mohammed Al-Tarawneh et al., International Humanitarian Law, ICRC, Amman, 2005 Diamond Larry, Democracy: Its Development and Ways to Enhance It, translated by Fawzia Naji, Dar Al-Mamoun for Translation, Iraq, 2005.	Yes
Recommended Texts	journal.un.org Hadi, Riad Azabz. (2005). Human rights (evolvingcontents and protection) (Baghdad).	Yes
Websites	Universal Declaration of Human Rights | United Nations https://sc.uobaghdad.edu.iq/?page_id=8415 https://www.youtube.com/@ansamalobidimanagerofhuman2891	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-	Considerable amount of work

			44)	required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية				
Module Title	**English Language**		**Module Delivery**	
Module Type	**Support**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UNI-1106**			
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	UGx11 1		**Semester of Delivery**	1
Administering Department	Biotechnology		**College**	College of Science
Module Leader	Shaymaa Hatam Abdulla		**e-mail**	shaymaa@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.
Module Tutor			**e-mail**	
Peer Reviewer Name			**e-mail**	
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	New Headway Beginner Plus is a Beginner course in English intended to provide students with the fundamentals of the language and a foundation at First Year students / college of science, moving towards a higher level of proficiency at this stage. 1. Listening Objectives: • Understand and respond to basic greetings, introductions, and simple instructions. • Comprehend and extract information from short, simple spoken passages related to everyday topics. • Identify and understand common vocabulary and expressions in spoken English. 2. Speaking Objectives: • Engage in basic conversations using simple greetings, introductions, and expressions related to personal information. • Ask and answer simple questions about personal details, daily routines, and familiar topics. • Participate in short dialogues and role-plays to practice communication skills. 3. Reading Objectives: • Read and comprehend simple texts, such as signs, labels, short passages, and dialogues. • Recognize and understand basic vocabulary words and phrases in context. • Extract information from texts related to everyday situations and topics. 4. Writing Objectives: • Write short sentences and paragraphs about personal information, experiences, and familiar topics. • Fill out basic forms with personal details, such as name, age, and nationality. • Write simple messages, notes, and emails related to everyday situations. 5. Vocabulary and Grammar Objectives: • Acquire a basic vocabulary related to common topics, such as greetings, numbers, time, family, food, and everyday objects. • Understand and use basic grammatical structures, including present simple, present continuous, simple past, and basic question forms. • Recognize and use common prepositions, articles, and basic sentence structures. 6. Cultural Awareness Objectives: • Develop an understanding of cultural customs and practices related to greetings, social norms, and everyday interactions in English-speaking countries. Gain exposure to cultural elements through reading or listening to texts about customs, traditions, and holidays.
Module Learning Outcomes	By the end of the course, the students will be able to: 1. Listening and Speaking Skills:

مخرجات التعلم للمادة الدراسية	• Understand and respond appropriately to basic questions and statements. • Engage in simple conversations related to personal information, daily routines, and immediate surroundings. • Follow simple instructions and directions. • Develop basic pronunciation and intonation skills. 2. Reading Skills: • Recognize and understand basic vocabulary words and phrases in simple texts. • Comprehend and extract information from short, simple texts such as signs, notices, and labels. • Understand basic sentence structures and common grammatical patterns. 3. Writing Skills: • Write simple sentences and short paragraphs about personal information, experiences, and familiar topics. • Fill out simple forms and write basic personal information. • Write simple messages, notes, and emails related to everyday situations. 4. Vocabulary and Grammar: • Acquire and use a basic range of vocabulary related to everyday topics, such as greetings, numbers, time, family, food, and common objects. • Understand and use basic grammatical structures, including present simple, present continuous, simple past, and basic question forms. • Recognize and use common prepositions, articles, and basic sentence structures. 5. Cultural Awareness: • Develop an understanding of cultural customs and practices related to greetings, social norms, and everyday interactions in English-speaking countries. • Gain exposure to cultural elements through reading or listening to texts about customs, traditions, and holidays.
Indicative Contents المحتويات الإرشادية	1- Use simple forms of polite expressions to establish basic social contact and to perform everyday functions including making requests and offers, conducting simple phone conversations, asking and telling time, giving simple directions, asking about price, ordering a meal, etc. 2- Use a narrow range of positive and negative adjectives to describe objects, people and places. 3- Exchange information by forming and responding to simple questions. 4- Produce simple sentences using the correct word order and punctuation marks. 5- Use capital and lower case letters accurately in writing.

	6- Construct a short guided paragraph on a familiar topic concerning home, family, friends and holidays. 7- Use the basic tenses including the present and past simple, a present continuous correctly. 8- Use the basic auxiliary verbs (am/is/are/was/were/can) and a range of regularand irregular verbs. 9- Demonstrate awareness of the essential grammatical features and functions including questions and negatives, plural nouns, frequency adverbs, possessives, pronouns and determiners.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Communicative Approach: Emphasize communicative activities that promote interaction among students. Encourage pair and group work, role-plays, and discussions to practice language skills in meaningful contexts. 2. Integrated Skills: Integrate the four language skills (speaking, listening, reading, and writing) in lessons to create a balanced approach to language learning. Provide opportunities for students to use and develop these skills simultaneously. 3. Vocabulary Expansion: Incorporate vocabulary-building exercises and activities throughout the course. Use real-life contexts, visuals, and practical examples to help students learn and remember new words. 4. Grammar Focus: Teach and reinforce grammar structures in a systematic and progressive manner. Provide clear explanations, examples, and practice exercises to ensure students understand and can apply the grammar rules correctly. 5. Authentic Materials: Include authentic texts, such as articles, newspaper clippings, songs, and videos, to expose students to real-world language usage. This helps develop their reading and listening comprehension skills and exposes them to cultural aspects of English-speaking countries. 6. Cultural Awareness: Integrate cultural topics and discussions into the lessons to foster cultural awareness and sensitivity. Encourage students to share their own cultural backgrounds and experiences to promote understanding and appreciation of diverse perspectives. 7. Error Correction: Provide constructive feedback and error correction during speaking and writing activities. Help students identify and correct their mistakes, focusing on accuracy while encouraging fluency and self-expression. 8. Technology Integration: Utilize technology tools, such as interactive whiteboards, online resources, and language learning apps, to engage students

	and enhance their language learning experience. Incorporate multimedia materials for listening and speaking practice. 9. Regular Assessment: Assess students' progress regularly through quizzes, tests, and assignments. Provide timely feedback to guide their learning and address areas that need improvement. 10. Individualization: Cater to the individual needs and learning styles of students. Offer differentiated tasks and activities to ensure all learners are appropriately challenged and supported. 11. Cooperative Learning: Promote collaboration and teamwork among students through pair work, group projects, and peer feedback. This encourages active participation and a supportive learning environment. 12. Review and Revision: Schedule regular review sessions to consolidate previously learned material. Encourage students to revise and practice independently, providing resources for self-study and additional practice.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Attending lectures	1	1%	1.5	41#15 weeks
	Report	1	10% (10)	13	LO # 5, 9 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	General introduction and the rules of how to speak English fluently?
Week 2	Week 2 Present simple and continuous tense.
Week 3	Week 3 Present perfect tense and its applications.
Week 4	Week 4 Past simple and continuous tense.
Week 5	Week 5 Past perfect tense and its applications.
Week 6	Week 6 Future simple and continuous tense.
Week 7	Week 7 Future perfect tense and its applications.
Week 8	Week 8 Auxiliary verbs
Week 9	Week 9 Prepositions
Week 10	Week 10 Irregular Verbs
Week 11	Week 11 Capitalization rules
Week 12	Week 12 Formal sentences and Informal sentences.
Week 13	Week 13 Narrative tenses
Week 14	Week 14 The Growing Popularity of Organic Food
Week 15	Week 15 Collective Wisdom of Ants

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Soars, John and Liz, (2011), New Headway Plus, SpecialEdition, Beginner Level, Oxford University Press.	Yes

Recommended Texts	New Headway Plus provides an integrated skills course witheach unit divided into grammar, vocabulary, skills work andeveryday English segments	Yes
Websites	Oxford University Press: The New Headway series is published by Oxford University Press. Visit their website at www.oup.com and search for "New Headway Plus, Special Edition, Beginner Level " or browse their English language teaching section for information on the course.	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Semester TWO

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية					
Module Title	**Principle of Biotechnology 2**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**072BIOT-1**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGx11 1		**Semester of Delivery**	2	
Administering Department	Biotechnology		**College**	College of Science	
Module Leader	Alyaa Maan Abdalhameed		**e-mail**	Alyaa.maen@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ziyad Kalouf Radeef		e-mail	**zeyadkh.radeef@uodiyala.edu.iq**	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Principles of Biotechnology	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1- To enable students to obtain knowledge and understanding the intellectual framwok, foundations and applications of biotechnology 2- To enable students to obtain knowledge and understanding of industrial, environment and food microbiology. 3- To enable students to obtain knowledge and understanding of genetics, genetic engineering and cytogenetics 4- To enable students to obtain knowledge and understanding botany andanimal tissues. 5- To enable students to obtain knowledge and understanding of cytology and microbiology 6- Found a mental and applications of biotechnology 7- Isolation, purification and treatment of various biological molecules
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Preparing specialists familiar with the basis of biotechnology (theoretically and practically) who are able to meet the needs of the labor market. 2- Conduction scientific research and trying to keep with the scientific development of biotechnologies. 3- Cooperate with state institution and the private sector by providing scientific consultation laboratory analysis in the fields of genetic, environment, industrial microbiology engineering. 4- Encourage scientific research and providing students with basic skill in biotechnologies and their applications in all fields. 5- Encourage the staff to participate in scientific forums inside and outside the country. **6-** Contribute to solve scientific problems in order to serve the national development planks.
Indicative Contents المحتويات الإرشادية	1- Genetics and Biotechnology Evolutionary stages of biotechnologies 2- Mutation 3- Methods of transmitting genetic material (gene) 4- Antibiotics 5- Enzyme production 6- Immobilization of Enzyme 7- Solid-state fermentations 8- Separation of biological products 9- Bioseparation (purification of biomaterials) 10- The relationship between the environment and biotechnologies

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Teaching students the basic foundations and principles of biotechnology related to thevarious directions of this field of knowledge in the sciences of industrial fermentation,genetic engineering, bioseparation, and how to exploit microbial, plant and animal cells in the production of materials of industrial or medical value to the consumer.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 4 and 6
	Assignments	2	10% (10)	2, 12	LO # 3, 4 and 6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	The concept of genetics, genetic engineering and categorical enzymes
Week 2	The concept of mutagenication types of physical and chemical mutagens
Week 3	Conjugation, phage transport and DNA manipulation technology

Week 4	The concept of antibiotics and microorganisms used in production
Week 5	First exam
Week 6	The concept of enzymes and microorganisms producing enzymes and their industrial and medical applications, Industrial production of enzymes
Week 7	The concept of restriction Enzyme restriction methods and their use
Week 8	MID EXAM
Week 9	The concept of solid state fermentations Microbiology feedstock used in SCP
Week 10	The concept of bioseparation and methods used in the extraction of biological materials
Week 11	Precipitation with ammonium sulfate, alcohol and other methods
Week 12	Ion exchange Chromatography, gel filtration Chromatography and affinity Chromatography
Week 13	Second exam
Week 14	The concept of biological control and microorganisms used
Week 15	The concept of mining microorganisms used

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: The Roles of Enzymes in Biotechnology
Week 2	The Roles of Enzymes in Biotechnology (practically)
Week 3	Lab 2: Enzyme purification by ammonium sulfate precipitation
Week 4	Enzyme purification by ammonium sulfate precipitation (practically)
Week 5	Lab 3: Immobilization of Enzymes
Week 6	Immobilization of Enzymes (practically)
Week 7	Lab 4: Production of Single cell protein from yeast
Week 8	Production of Single cell protein from yeast (practically)
Week 9	Lab 5: Antibacterial Activity of Ginger (*Zingiber Officinale*) Extract

Week 10	Antibacterial Activity of Ginger (*Zingiber Officinale*) Extract (practically)
Week 11	Lab 6: Solid state fermentation (SSF)
Week 12	Solid state fermentation (SSF) (practically)
Week 13	Lab 7: What is a restriction enzyme?
Week 14	What is a restriction enzyme? (practically)
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Microbiology and Biotechnology (2001) -1 A Text book of Biotechnology(2006) -2	Yes
Recommended Texts	Methods in Biotechnology (1997)-1 Biotechnology, Principles and Application (1988) -2	Yes
Websites	https://books.google.iq/books?id=K7kLyFX_qtUC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**F** – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information

معلومات المادة الدراسية

Module Title	**General Biology** 2	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-1208**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		

Module Level	UGx11 1	**Semester of Delivery**	2
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Alyaa Maan Abd Alhameed	**e-mail**	alyaa.maen@uodiyala.edu.iq
Module Leader's Acad. Title	sProfessor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Shaymaa Hatem Al-Majmaie	**e-mail**	shaymaa@uodiyala.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Principles of Biotechnology	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. This course deals with the basic concept of Zoology. 2. To understand the role of Zoology in the Biotechnology field.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. To know the general information about Zoology and its branches.** **2. Recognize the classification systems of the animal kingdom, and the main divisions and characteristics of each division and class with examples** **3. To understand the chemistry of life the components including lipids, and carbohydrates.** **4. To understand the chemistry of life the components including protein, and nucleic acid.** **5. To understand the animal cell structure and functions such as cell membrane, cytoplasm, mitochondria, and endoplasmic reticulum.** **6. To understand the animal cell structure and functions such as the nucleus, Golgi apparatus, cilia and flagella, centrioles, and cytoskeleton.** **7. To have knowledge about the main technique for an animal transport system.** **8. To know cell signaling and communication.** **9. Understanding the cell division including mitosis and meiosis.** **10. To understand some cell functions such as the Cellular Respiration** **11. Study animal disruption, revolution, and development.** **12. The evolutionary history of biological diversity Phylogenetic tree** **13. To understand the function of some organs in the animal system, for example, the digestive system.** **14. Recognize how animal cells can play a very important role in biotechnology.** **15. Recognize how animal models can play a very important role in biotechnology such as the production of biomaterials and other applications**
Indicative Contents المحتويات الإرشادية	Indicative content includes the following:- 1- Introduction, Zoology classification systems, How animal cells differ from plant,Morphology of fungi, Reproduction 2- Important of fungi, Living mode of fungi, Cultivation of fungi, sexual and asexualreproduction in fungi. 3- Classification of fungi, Division 1: Myxomycota, general characteristics, the classes involved in this division. (One example for each class). 4- Division 2: Eumycota , general characteristics, Class 1,Chytridiomycetes and

	its classification, Class 2, Hyphochytridiomyctes. 5- Division 2: Eumycota, Class 3: Oomyctes , general characteristics, and the classification of this class. 6- Division 2: Eumycota, Class 4: Zygomycetes, general characteristics, Orders involved in this class. The role of some strains in production of biomaterials. 7- Division 2: Eumycota, Class 5: Ascomycetes, general characteristics, Subclasses involved in this class. The role of some strains in production of biomaterials, food manufacturing, plant pathogens, Human pathogens. 8- Division 2: Eumycota, Class 6: Basidimycetes, general chracteristics, Subclasses involved in this class. The role of some strains in production of enzymes such laccase, peroxidase, cellulose, Edible and poising mushroom. 9- Division 2: Eumycota, Class 7: Deutromycetes, general chracteristics, Subclasses involved in this class. 10- Medical mycology Mycotoxins

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the collection of different samples, media preparation. Isolation and primitive identification according to the acquired skills from the theoretical and practical information through lectures and Lab.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

As		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessm	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 4 and 6
	Assignments	2	10% (10)	2, 12	LO # 3, 4 and 6

ent	**Projects / Lab.**	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	**Material Covered**
Week 1	Introduction, branches such as morphology, histology, cytology, physiology, genetics, ecology, and Taxonomy
Week 2	Classification of Zoology including kingdom, phylum, class, order, family, genus, and species.
Week 3	Study the chemistry of life such as macromolecules and carbohydrates and lipids.
Week 4	Study the chemistry of life such as the structure and function of proteins and the structure of nucleic acid, DNA and RNA, the type of RNA.
Week 5	Cell membrane structure and components, cytoplasm, the cytoplasm structure, mitochondria and endoplasm reticulum
Week 6	Structure and function of cells such as of nucleus, Golgi apparatus, cilia, and flagella,centrioles, and cytoskeleton.
Week 7	Midterm exam
Week 8	Transport system in animals: cell -Plasma Membrane Functions,-Diffusion, Osmosis, Facilitated transport, Active transport, Endocytosis, and Exocytosis
Week 9	Type of cell signal, a cascade of signaling events, relay, integration and distribution of signal transducer, signaling pathways regulator and cellular function
Week 10	Mitosis and meiosis, prophase, metaphase, anaphase, telophase, the function of mitosis, development and growth, cell replacement, regeneration, meiosis I meiosis II.
Week 11	Study animal disruption, revolution, and development. Source of variation, modern synthesis, anatomy, fossils, direct observation, analogy, morphology, natural selection,population
Week 12	Phylogenetic tree, protist, protozoa, Protophyta, Molds.
Week 13	Animal cell application, gene therapy, drug screening, production of vaccine, production of therapeutic protein
Week	Animal model: drug pharmacological, disease resistance models, mutation induced models, stress

14	induced model
Week 15	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Introduction
Week 2	Lab 2: -Microscope Parts and functions
Week 3	Lab 3: Functions of cell membrane-Composition of cell membrane.
Week 4	Lab 4: Methods of transport across membranes, Diffusion, Osmosis, Facilitated transport, Aactive transport, Endocytosis and Exocytosis
Week 5	Lab 5: The stages of mitosis, Why use onion roots for viewing mitosis? Viewing Chromosomes
Week 6	Lab 6: cell respiration
Week 7	Lab 7: Phylogenetic tree, protist, protozoa, Protophyta, Molds.
Week 8	Lab 8: Animal cell application, gene therapy, drug screening, production of vaccine, production of therapeutic protein
Week 9	Lab 9: Animal model: drug pharmacological, disease resistance models, mutation induced models, stress induced model
Week 10	Lab 10: final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	M. Koto-The. Biology of biodiversity-Springer -1 E.O. Wilson-Biodiversity-Academic Press -2 Washington. G.G.-Simpson-Principle of animal taxonomy -3 OxfordIBH Publication company.	Yes
Recommended Texts	Skoal R.R. and F.J.Rohiff Biometry-Freeman, San-Francisco	Yes
Websites	https://www.khanacademy.org/science/biology	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Organic chemistry**	**Module Delivery**	
Module Type	Core	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	BIOT-1209		
ECTS Credits	7		
SWL (hr/Sem)	175		
Module Level	UGx11 1	**Semester of Delivery**	2
Administering Department	Chemistry	**College**	College of Science

Module Leader	Mohamed Jabar Mohamed	**e-mail**	mohammedjabbar0908@gmail.com
Module Leader's Acad. Title	Assistance Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2025	**Version Number**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to provide a good foundation to the students in Organic Chemistry. It teaches fundamental chemical ideas in the framework of Organic Chemistry and begins to build the more specialized understanding of organic processes needed for following modules. This module will be included the main points: 1. Basic principles of organic chemistry for predicting the atom and electronic structure of molecules, their stability, reactivity, and molecular characteristics including bond types and hybridization. 2. Know the organic compounds naming and categorization. 3. Through lectures, workshops, tutorials, and seminars, the students will learn more about organic chemistry and understand it better. This course will give them the confidence to talk about the path of simple processes using the language of organic chemistry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**According to the delivery plan , the students who successfully complete the organic chemistry 2 module will be able to:** **1. Predict and explain the expected chemical and physical behavior of an organic compound based on its functional groups and geometry. Identify the electronic configuration of elements atomic and molecular orbitals, especially carbon atoms. Study the types of bonds between elements and the hybridization types of atoms. Recognize the structural isomers, molecular formula, melting points and boiling points.** **2. Recognize the hydrocarbons generally, and then study All organic compounds are derived from the hydrocarbons because they are made up of only hydrogen and carbon. On the basis of structure,**

	hydrocarbons are divided into two main classes—aliphatic and aromatic. Aliphatic hydrocarbons do not contain the benzene group, or the benzene ring, whereas aromatic hydrocarbons contain one or more benzene rings. **3. Preparation of alkanes and Cycloalkanes: Hydrogenation, Reduction of alkyl halides, Coupling of alkyl halides with organometallic compounds.** **4. Studying structure and shape of alkenes, Geometric Isomers, Nomenclature, preparations, Dehydrohalogenation of alkyl halides, Dehydration of alcohols, Dehalogenation of vicinal dihalides, Reduction of alkynes.** **5. Reactions of the carbon-carbon double bond: ADDITION REACTIONS, Catalytic hydrogenation, Addition of halogens, Hydroxylation. Glycol formation, Addition of hydrogen halides, Addition of sulfuric acid, Polymerization.** **6. Structure and Bonding in Alkynes, Nomenclature, Preparations, Dehydrohalogenation of alkyl dihalides, Dehalogenation of tetrahalides, Reaction of sodium acetylides with primary alkyl halides, Reactions of Alkynes.** **7. Nomenclature of Benzene Derivatives, Monosubstituted Benzenes, Disubstituted Benzenes, Polysubstituted Benzenes, reactions of benzene: Electrophilic Aromatic Substitution.** **8. Effect of substituent groups on benzene (Activating and Deactivating groups), Bromination, Nitration etc.**
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Structural isomers and orbital views of bonding; Structure of alkanes;Physical and chemical properties of alkanes, alkenes, and alkynes. 2. Terminology, essential ideas, and some basics of organic chemistry. 3. Basic reactions of alkanes, alkenes, alkynes, Benzene Derivatives;Reactivity and Orientation Naming and classification of organic compounds.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ **15** اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction of organic chemistry
Week 2	Nomenclature of alkanes
Week 3	structure and physical properties of alkanes
Week 4	Reaction of alkanes
Week 5	Synthesis of alkanes
Week 6	Nomenclature of alkene, ,
Week 7	structure and physical properties of alkenes
Week 8	Reaction of alkenes
Week 9	synthesis,and reactions of alkenes
Week 10	Nomenclature of alkynes
Week 11	structure and physical properties of alkynes
Week 12	Reaction of alkynes
Week 13	synthesis,and reactions of alkynes
Week 14	Aromatic compounds and Aromatic substitution reactions
Week 15	Aldehydes and ketones
Week 16	Organic acids

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Determination of Melting point
Week 2	Determination of Boiling point
Week 3	Determination of sublimation
Week 4	Recrystallization : Purification of crystalline organic compound
Week 5	Extraction
Week 6	Distillation
Week 7	Simple distillation
Week 8	Fractional distillation
Week 9	Qualitative characterization of functional groups (Baeyer)
Week 10	Qualitative characterization of functional groups (Tollen)
Week 11	Qualitative characterization of functional groups (Lucas)
Week 12	Qualitative test to defferentiate between type of alcohols (Jones
Week 13	Qualitative characterization of functional groups (carbonyl)
Week 14	Qualitative characterization of functional groups (haloalkane)

Week 15	Qualitative characterization of functional groups (carboxylic acid)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
1	Organic Chemistry, Morrison and Boyed, 6th ed., 1992, Allyn and Bacon	
2	Organic Chemistry, Paula Y. Bruice, 6 th ed., 2011	

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX - Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F - Fail	راسب	(0-44)	Considerable amount of work required

Note:
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة

Module Information معلومات المادة الدراسية					
Module Title	**Computer Skills**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**SCI-1211**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		UGx11 1	**Semester of Delivery**		2
Administering Department		Computer	**College**	College of Science	
Module Leader	Shaymaa Hatem Al-Majmaie		**e-mail**	shaymaa@uodiyala.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• This module sets out essential concepts and skills relating to the use of devices. • This module covers the key skills and main concepts relating to computers, devices, file creation and management, web browsing, and data security.

	Help students to demonstrate the ability to use word processing formatting, finishing small-sized word processing documents, such as letters and other everyday documents. • Help students to demonstrate the ability to use a power point application to accomplish tasks associated with creating, and formatting a presentation. • Help students to demonstrate the ability to use Excel application to accomplish a spreadsheet for tasks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, a student will be able to: 1. Understand key concepts relating to computers, devices and software. 2. Identify the main types of Integrated and External equipment 3. Understand concepts of online communities, communications and e-mail 4. Adjust the main operating system settings and use built-in help features. 5. Know about the main concepts of file management and be able to efficiently organize files and folders. 6. Create a report by Ms. Word document and print an output. 7. Use University email to Collaborate inside and outside university and How to participate in video conference using meet 8. Create a presentation using power point application. **9.** Create a spreadsheet using Excel application.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: - The general purpose computer model: All types of computers follow the same structure and perform the basic operations (Input, Processing, Output, Storage and controlling) to converting raw input (data) to information. - Components of a computer Hardware: Each computer consists of Hardware and software. The Hardware includes input devices, output devices, system units, storage devices, and communication devices. - System Units (Internal & External components of system units): The internal component of the system units is consists of (CPU, Motherboard, RAM, Ports, Hard disk …). - Central Processing Unit: ALU, CU, and memory unit. - Memory and its Types ▪ Cache Memory ▪ Primary memory –Comparison between RAM & ROM ▪ Secondary Storage - Ports and their types (Ports: is a connection points used as an interface between the computer and its peripheral devices (Serial ports, Parallel ports, PS/2, USB, VGA …)). - Input Devices (Keyboard, Mouse, …) - Output Devices (Printer, speaker, monitors, …) - Software Types of Software

	▪ Operating System (Windows, Linux, …) ▪ Application Software & their types ▪ Programming Languages (Low, Assembly, High level). Internet, Benefits, Browsing the Web (Web Browser) , Search the web (search - Communication Technology: It plays an important role in almost every activity that we performed. The best examples of Communication technology includes: blogs, Web sites, live video, social media technology, and E-mail communication. - E-mail: free e-mail providers (G-mail, Yahoo-mail, …), send and receive E-mail operation, send e-mail with attachment, checking the e-mail boxes (inbox, sendbox, spam …). - Security and keeping information safe: protect the information from unauthorized access and prevent use, modification, and destruction of thisinformation. - Virus transmission ways to the computer: by e-mail, Downloading from the Internet, Pirated software, Exchange of diskettes, in attached e-mail, and indocuments. - Protection against viruses: install good anti-viruses. - Antivirus, benefits and Types Introduction to windows - Desktop Components: (Icons, Start, task bar …) - The start menu (its functions and properties) ▪

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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. Different forms of teaching will be used to reach the objective of this module, including power point presentation for the subjects which contains titles, definitions, summary and conclusions, whiteboard will be used and classroom discussion with assignments, the students will be asked to prepare papers on selective topics.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	26	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.73

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75

Module Evaluation
تقييم المادة الدراسية

As		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 4 and 6
	Assignments	2	10% (10)	2, 12	LO # 3, 4 and 6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to Computers – definition -The purposes of using a computer. -The general purpose computer model. -The difference between Data and Information concepts.Introduction to windows - Desktop Components - The start menu (its functions and properties)
Week 2	The Components of a computer: Hardware - System Units (Internal & External components of system units) - Central Processing Unit (Features and components)Windows: - Task bar and its functions and properties
Week 3	- Memory and its Types ▪ Cache Memory ▪ Primary memory –Comparison between RAM & ROM ▪ Secondary StorageWindows:

	- Files and Folders: All operations on files and folders (selection, creation, saving, moving andrenaming.
Week 4	Ports and their types - Input Devices, - Output Devices Windows: - Delete Files. - Recycle bin. - Creating a Shortcut. - Desktop Icons. - The Windows Explorer Views. - Sort files.
Week 5	- Software Types of Software ▪ Operating System ▪ Application Software & their typesProgramming Languages Windows: -Customizing the desktop. -Change screen resolution. - Change Desktop Background
Week 6	- Communication Technology - E-mail Windows: - Print Screen - Cleaning Up the Disk - Defragmenting the Disk **Quiz (1, 2, 3, 4, 5) -Windows only**
Week 7	- Internet, Browsing the Web (Web Browser) , Search the web (search engine) - Security and keeping information safe -Virus transmission ways to the computer -Protection against viruses -Antivirus, benefits and Types
Week 8	**Mid Exam**
Week 9	Microsoft Word - - Word Program Interface -Keyboard Shortcuts in Microsoft Word -The operations on Text - File Menu Home Tab & it commands - Insert Tab (Pages & tables Groups) - Table Tools
Week 10	Microsoft Word - Insert Tab (Illustrations, Header & Footer, Text and Symbols Groups) - Page Layout, References, Review Tabs **Quiz (Week 8, 9)**
Week 11	Microsoft PowerPoint - PowerPoint program Interface. - File Menu - Home Tab & it commands - Operations on the Slides (duplicate, Delete, and Move)
Week 12	Microsoft PowerPoint - Insert Tab, Design Tab, Slide Show Tab and their commands - Transitions, and Animations Tabs

Week 13	Microsoft Excel - File Menu, Home Tab & it commands
Week 14	Microsoft Excel - Excel Worksheet Basics - Cell format
Week 15	**Preparatory Week**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. M. E. Vermaat and G. B. Shelly, *Discovering Computers Fundamentals: Living in a Digital World,*Shelly Cashman, 2011 Edition. 2. J. Lambert, J. Cox , and C. Frye, *Microsoft OfficeProfessional 2010 Step by Step* , 1'st Edition, Microsoft Press, 2010, 152P.	E-Copy
Recommended Texts	D. Hajek and C. Herrera***, Introduction to Computers 2022 Edition,*** Independently published, May 19, 2022,255P.	NO
Websites	1. https://theictbook.com/components-of-the-system-unit-and-their-functions/ 2. https://www.tutorialspoint.com/computer_fundamentals/index.htm 3. https://www.slideshare.net/Jamjolojessa/types-of-application-software?from_action=sav 4. https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/1 5. https://generalnote.com/Computer-Fundamental/ 6. https://edu.gcfglobal.org/en/word2010/# 7. https://edu.gcfglobal.org/en/powerpoint2010/# 8. https://edu.gcfglobal.org/en/excel2010/# 9. https://antivirus.comodo.com/blog/computer-safety/what-is-antivirus 10. https://thingscouplesdo.com/what-is-the-antivirus-software-that-is-best-for-a- user	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks**	**Definition**

			(%)	
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية					
Module Title	اللغة العربية			**Module Delivery**	
Module Type	**Support**			**Theory** **Lecture** Lab Tutorial Practical **Seminar**	
Module Code	**UNI-1212**				
ECTS Credits	2				
SWL (hr/sem)	**50**				
Module Level		UGx11 2	**Semester of Delivery**		2
Administering Department			**College**	College of Science	
Module Leader	Othman Khlan Farhan		**e-mail**	othaman@uodiyala.edu.iq	

Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name(if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	**1- تعريف الطلبة اهم المفاتيح الأساس في التعامل بلغة عربية فصيحة خالية من اي خطأ أو لحنٍ وكيفية التعلم فيما يخص الأدب والنحو والبلاغة والاملاء العربية وكل هذا لغير الاختصاص.** **2- رفع القدرات التعبيرية للطالب، وزيادة ثروتهم اللغوية ، ومساعدتهم على استخدام العبارة المناسبة بشكل دلالي واضح.** **3-تدريب الطلبة على التحدث، والتنظيم المنطقي للأفكار، مع الحرص على التمسك باللغة العربية الفصحى .** **4- رفع الأداء اللغوي العام لدى الطلبة.** **5- تمكين الطلبة من الكتابة والتعبير والحديث بلغة عربية فصيحة وواضحة.** **6- مساعدة الطلبة في التعبير عن افكارهم من خلال المناقشة والحوار بلغة سهلة وفصيحة .** **7- جعل الطلبة قادرين على اكتساب خزين لغوي من الكلمات واللفاظ والتعابير الفصيحة.** **8- تعلم الطلبة الحفاظ على لغة القرآن التراث العربي الاصيل.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**الاهداف المعرفية والمهارية:** **1- يعرف اساليب اللغة العربية.** **2- يوظف ادوات الترقيم عند الكتابة .** **3- يتدرب على كيفية تحليل النصوص الادبية .** **4- يعرب بعض الامثلة والتمارين عن الجملة الاسمية والفعلية .** **5-يناقش بعض النصوص القرآنية والادبية .** **6- يبين الفرق بين علامات الاعراب الاصلية والفرعية.** **7- يميز بين الافعال والاسماء في الجمل.** **8– يتدرب على القراءة الواضحة والإلقاء .** **9- يتدرب على الكتابة بخط حسن من خلال التعريف بأنواع الخطوط العربية، وكتابة كل حرف، ثم كتاب الجمل والعبارات بخط الرقعة.**

	10- يميز بين حمزة القطع وهمزة الوصل عند الكتابة . **11- يتعلم اساليب التحدث أمام الآخرين مع استعمال التأشير باليد والعين والجسد بما يتناسب مع الكلام .** **12- يميز بين حرفي الضاد والظاء في الكتابة والنطق.** **13- يميز بين التاء المربوطة والمفتوحة اثناء الكتابة.**
Indicative Contents المحتويات الإرشادية	توضيح أهمية اللغة العربية وفوائدها بالنسبة للطالب الجامعي (2 ساعة). اللغة، حفظ وتفسير وتحليل أول عشرة آيات من سورة الكهف مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية. (2 ساعة) اللغة، حفظ وتفسير وتحليل ثلاثة آيات من سورة الحجرات مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.(2 ساعة) الادب، حفظ وتحليل ثلاثة عشر سطراً من قصيدة سفر ايوب في الشعر الحر للشاعر العراقي بدر شاكر السياب مع حياة الشاعر واهم الاوجه البلاغية والنحوية في القصيدة.(2 ساعة) الادب، حفظ وتحليل ثمانية ابيات في الحماس للشاعر ابي الطيب المتنبي مع حياة الشاعر مع اهم الاوجه البلاغية والنحوية في القصيدة.(2 ساعة) قواعد اللغة العربية وأهميتها معرفة اقسام الكلام(الاسم والفعل والحرف)واهم علاماتها. قواعد اللغة العربية :- النكرة والمعرفة، انواع المعارف(العلم) شرح موضوع (اسم العلم والاسم المركب) مع الأمثلة.(2 ساعة) قواعد اللغة العربية، (الضمائر)شرح موضوع(ضمائر الرفع والنصب والجر) مع الامثلة.(2 ساعة) اللغة، حفظ وتفسير وتحليل سورة الاعلى مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية. الادب، حفظ وتحليل ثمانية ابيات من قصيدة (كن بلسما) للشاعر (ايليا ابي ماضي)مع حياة الشاعر مع اهم الحالات الاعرابية والبلاغية. (2 ساعة) قواعد اللغة العربية، شرح موضوع (اسماء الاشارة) مع الأمثلة وحالات الاعراب، شرح موضوع (المعرف بالإضافة) مع الأمثلة وحالات الاعراب.(2 ساعة) قواعد اللغة العربية، شرح موضوع (الحال)معرفة الحال وصاحبها وما هي انواع الحال مع الأمثلة وحالات الاعراب.(2 ساعة) الأملاء في اللغة العربية، علامات الترقيم واهميتها في اللغة العربية.(2 ساعة) قواعد اللغة العربية، شرح موضوع (العدد)معرفة تميز العدد وماهي اقسام العدد مع الأمثلة وحالات الاعراب.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- **المحاضرة والمشاركة.** - **المناقشة والحوار.** - **العصف الذهني.** - **كتابة التقارير عن الموضوع.** - **السؤال والجواب.**

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	5	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**توضيح أهمية اللغة العربية وفوائدها بالنسبة للطالب الجامعي.** **اللغة، حفظ وتفسير وتحليل أول عشرة آيات من سورة الكهف مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.**
Week 2	**اللغة، حفظ وتفسير وتحليل ثلاثة آيات من سورة الحجرات مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.**
Week 3	**الادب، حفظ وتحليل ثلاثة عشر سطراً من قصيدة سفر ايوب في الشعر الحر للشاعر العراقي بدر شاكر السياب مع حياة الشاعر واهم الاوجه البلاغية والنحوية في القصيدة. الأدب، حفظ وتحليل ثمانية ابيات من قصيدة (ابى الدهر)للشاعر محمود سامي البارودي.**
Week 4	**الادب، حفظ وتحليل ثمانية ابيات من قصيدة(الحماسة) للشاعر ابي الطيب المتنبي مع حياة الشاعر مع اهم الاوجه البلاغية**

	والنحوية في القصيدة.
Week 5	قواعد اللغة العربية وأهميتها معرفة اقسام الكلام(الاسم والفعل والحرف)واهم علاماتها. النكرة والمعرفة، انواع المعارف(العلم) شرح موضوع (اسم العلم والاسم المركب) مع الأمثلة.
Week 6	قواعد اللغة العربية، شرح موضوع(المبتدأ والخبر) تقديم وتأخير المبتدأ والخبر ، وماهي انواع الخبر.
Week 7	قواعد اللغة العربية، (الضمائر)شرح موضوع(ضمائر الرفع والنصب والجر) مع الامثلة.
Week 8	اللغة، حفظ وتفسير وتحليل سورة الاعلى مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.
Week 9	الادب، حفظ وتحليل ثمانية ابيات من قصيدة (كن بلسما) للشاعر (ايليا ابي ماضي)مع حياة الشاعر مع اهم الحالات الاعرابية والبلاغية. حفظ وتحليل ثمانية ابيات من قصيدة (ارح ركابك)للشاعر محمد مهدي الجواهري.
Week 10	قواعد اللغة العربية، شرح موضوع (اسماء الاشارة) مع الأمثلة وحالات الاعراب، شرح موضوع (المعرف بالإضافة) مع الأمثلة وحالات الاعراب.
Week 11	قواعد اللغة العربية، شرح موضوع (الحال)معرفة الحال وصاحبها وما هي انواع الحال مع الأمثلة وحالات الاعراب. الأملاء في اللغة العربية، علامات الترقيم واهميتها في اللغة العربية.
Week 12	قواعد اللغة العربية، شرح موضوع (العدد)معرفة تميز العدد وماهي اقسام العدد مع الأمثلة وحالات الاعراب.
Week 13	الأملاء في اللغة العربية، احكام الهمزة(حمزة الوصل، حمزة القطع، كتابة الهمزة في وسط الكلمة).
Week 14	قواعد اللغة العربية، شرح موضوع (كان واخواتها) مع الامثلة وحالات الإعراب. الأملاء في اللغة العربية: احكام كتابة الضاد والظاء
Week 15	قواعد اللغة العربية، شرح موضوع (إن واخواتها) مع الامثلة وحالات الإعراب. الأملاء في اللغة العربية: احكام كتابة التاء المربوطة والمفتوحة والالف الممدودة والمقصورة.

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. القرآن الكريم. 2. كتاب البلاغة والتطبيق. 3. كتاب الأملاء الواضح . 4. منهاج اللغة العربية لغير الاختصاص.	Yes
Recommended Texts	1. كتاب شرح ابن عقيل على الفية ابن مالك/ ابن عقيل عبد الله بن عبد الرحمن. 2. كتاب الميسر في اللغة العربية لغير الاختصاص/ الدكتور زياد طارق شولي 3. كتاب الأملاء الواضح/ للدكتور عباس حسن. 4. منهاج اللغة العربية العامة لغير الاختصاص/ عبد القادر حسن امين	Yes

Websites	1- مكتبة المصطفى http://www.al-mostafa.com/index.htm 2- مكتبة مشكاة الإسلام http://www.almeshkat.net/books/index.php 3- الجمعية العلمية للغة العربية http://www.imamu.edu.sa/arabiyah منتديات الكتب المصورة http://pdfbooks.net/vb/login.php

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة

Module Information معلومات المادة الدراسية		
Module Title	Biostatistics	
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical
Module Code	**BIT-1204**	
ECTS Credits	**4**	

SWL (hr/sem)	**100**	☒ Seminar	
Module Level	UGx11 1	**Semester of Delivery**	2
Administering Department		**College**	College of Science
Module Leader	Fatima M ABOUD	**e-mail**	fatima.aboud@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	**Introducing students to the principles of life statistics and the statistical methods used in the analysis of laboratory experiments.** **Introducing students to some modern statistical computer programs.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Develop the student's ability to recall what he learned about the cell live 2- Develop the ability to interpret Prediction and inference. **3-** Develop applied capabilities **4-** Providing the student with the ability to analyze **5-** Develop the student's ability to integrate ideas and information (synthesis level). **6-** It is the opposite of analysis

	7- Develop the student's ability to give judgment on the value of thematerial Educated.
Indicative Contents المحتويات الإرشادية	Improving the student's ability to observe To learn how to imitate and imitate: Imitationto learn the method of experimentation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Conducting fun scientific competitions (individual or team).Organizing lectures prepared by students.** **Formation of volunteer work groups.Scientific trips.**

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	10% (10)	Continuous	All
	Report	2	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Concepts Fundamental
Week 2	Presentation of Data
Week 3	Measures of Central Tendency
Week 4	Measures of Dispersion
Week 5	for distributions, the binomial distribution, normal distribution
Week 6	Statistical tests T test, Z test, X test, F test
Week 7	Analysis of variance, experiment, unit experimental, treatment, refined, degrees of freedom, total squares, mean Squares Significant differences test
Week 8	regression, correlation coefficient
Week 9	SPSS statistical program introduction and definition
Week 10	Introducing Spss tools
Week 11	Application analysis examples of laboratory experiments using the spss program
Week 12	Methods of expressing the statistical results of biological experiments Variance
Week 13	Analysis of Variance
Week 14	Some Special Probability distributions
Week 15	Preparatory week

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	مبادئ الإحصاء الحيوي، شحادة عبده .(2017)) كتاب الإحصاء الطبي والحيوي، فراس رشاد السامرائي (2015	
Recommended Texts	أمير حنا هرمز " الإحصاء الرياضي " جامعة الموصل 1990) ،) ، الموصل جامعة " العشوائية والمتغيرات الاحتمالية " ذنون يونس باسل (2 1985) ، الموصل جامعة "الإحصاء إلى المدخل " الراوي محمود خاشع 1979 (3 احمد ترجمة " الصحية للعلوم الحياتي الإحصاء مقدمة " دي . روبرت (حميد (4 بغداد جامعة ، وآخرون الخياط 1989 " الإحصاء مبادى " سيفي صادق محمد وعلي الغرابي إسماعيل سليم (جامعة (5 بغداد 1985 البصرة جامعة " الرياضي الإحصاء في مقدمة " سليم داود صباح 1989 (، (6) ، الموصل جامعة " الإحصاء " الصفاوي يونس صفاء 2008 (7 كمبيوتر برامج مع الوصفي الإحصاء " الملا خالد و شربجي الرزاق عبد (بلغة (8 للملايين العلم دار " بيسك بيروت 1987 جامعة " الإحصاء " هرمز حنا وأمير المشهداني، حسن محمود 1985 (بغداد ، (9) جامعة " الإحصائية والطرق الإحصاء أصول " المشهداني حسن محمود (10 بغداد ، 1985 علي الرحيم عبد احمد ترجمة ،"الحياتية للعلوم الإحصاء" شيفلر، .س وليام ((11 خطار، منسي الدين وسيف 1984جامعة البصرة،	NO
Websites	https://www.syriamath.net/library	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D -	متوسط	60 -	Fair but with major shortcomings

	Satisfactory		69	
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Semester THREE

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Microbiology I			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	BIOT-1311				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGx11 2		**Semester of Delivery**	3	
Administering Department	Biotechnology		**College**	College of Science	
Module Leader	Hiba Hilal		**e-mail**	Hiba.a@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	Hadeel Areibi		**e-mail**	Hadeel.a@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Pathogenic bacteria, mycology, immunology and virology.	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. **Enable students to obtain knowledge and understanding of microbiology.** 2. **Providing students with basics and topics related to all branches of microbiology.** 3. **This course deals with the basic concept of microbiology.** 4. **Improving students' skills in scientific research and providing them with basic skills in conducting scientific research and all applications related to microbiology.** 5. **Preparing specialized students familiar with the basics of microbiology, theoretically and practically, who are able to meet the needs of the labor market.** 6. **To develop practical microbiological skills principally diagnosis of causative agents of the infections and diseases of humans and Zoology in additions to learning the ways to controlling and overcome the healthy problems.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. **After taken this course the students can recognize all branches of microbiology and Enhancing their knowledge about them.** 2. **List the various terms associated with microbiology.** 3. **Summarize what is meant by microorganisms and their relation to our life.** 4. **Discuss the most details of microorganisms and their involvement in many other fields such as healthy, ecology, epidemiology, industry and etc.** 5. **Be able to describe, recognize and identify the causative structures, shapes and their sizes and arrangement and other details.** 6. **Identify the basic requirements and ingredients for each pathogen invaders.** 7. **Be familiar with the using of the safe application of some of the basic laboratory equipment that's applying in microbiological studies and researches.** 8. **Also be familiar with different strategies for preventing all forms of contamination during the work in the lab. and how can the controlling it.**
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	**Microbes in our Lives:** History of Microbiology, Naming and Classify Microorganism Bacteria, Fungus ,Protozoa ,Algae, Virus **Supplies and Growth of microbes:** The Supplies for Growth Physical elements Chemical and selective ,minimal ,enrich media - Types of Chemical principle bonds, PH ,buffer, oxidation **Physiology and Metabolism of the bacteria** Microbial metabolism: Is the means by which a microbe obtains the energy and nutrients (e.g. carbon) it needs to live and reproduce **Microbial Genetics:** Structure and replication of DNA Genetic Transfer and Recombination Transformation, Conjugation,Transduction

	Principles of Diseases: Pathology, Normal Flora Infection and Disease and Opportunists Hosts, Nosocomial Infections, Transmission, Reservoirs **Antimicrobial agents:** Types of antimicrobial agents ,antibiotics ,bacteriocine source of isolates

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects /	1	10% (10)	Continu	All

	Lab.			ous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Introduction and history of microbiology**
Week 2	**Eukaryotes and prokaryotes cells.** **Bacterial cell structure and their function**
Week 3	**Growth and Nutrition of the bacteria.**
Week 4	**Physiology and Metabolism of the bacteria.**
Week 5	**Bacterial virulence and pathogenesis.**
Week 6	**Sterilization and disinfection.**
Week 7	**Mid-term Exam.**
Week 8	**Antibiotics and chemotherapeutic agents.**
Week 9	**Bacterial genetics.**
Week 10	**Mycology / introduction.**
Week 11	**Fungi Structure, growth, nutrition and reproduction.**
Week 12	**Classification and pathogenesis.**
Week 13	**Fungal infection and their causative agents. (included three lectures).**
Week 14	**Fungal infection and their causative agents.**
Week 15	**Fungal infection and their causative agents.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: **Biosafety procedure, precautions and Microscope.**
Week 2	Lab 2: **Tools, instruments and equipment.**
Week 3	Lab 3: **Staining methods of bacteria.**
Week 4	**Lab 4: Acid fast stains** **(Ziehl – Nielson technique) and special stains.**
Week 5	Lab 5: **Capsule stain and their types.**
Week 6	Lab 6: **Examination.**
Week 7	Lab 7: **Culture media, preparation and their types.**
Week 8	**Lab.8: Growing and Cultivation of the bacterial species in the lab.**
Week 9	**Lab. 9: - Cultivation of the bacteria in the liquid media (broth) / Motility tests**
Week 10	**Biochemical test.**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Jawetz, Melnick and Adellberg's. (2011). Textbook of Medical Microbiology.26th Edition. .1	Yes
Recommended Texts	2. Connie,R. Mahon; Donald, C. Leham and George Manguselis. (2011): Text book of Diagnostic Microbiology. Fourth edition.	No
Websites	https://www.microbiologyresearch.org - https://microbiologysociety.org/why-microbiology-matters/what-is-microbiology.html -	

Grading Scheme

مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Environmental Microbiology	**Module Delivery**	
Module Type	Core	☒ **Theory** ☐**Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	BIOT-1312		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGx11 2	**Semester of Delivery**	3

Administering Department	Biotechnology	**College**	College of Science
Module Leader	Zainaba bed	**e-mail**	Zainababed@uodiyala.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Mariam Abdeulsalam	**e-mail**	**Mariamabdul_salam@uodiyala.edu.iq**
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	1/06/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Microbiology	**Semester**	5.26
Co-requisites module	Environmental Biotechnology	**Semester**	4.73

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- This course deals with the study of microorganisms in different Environments such as soil, water and air. 2- To understand the role of microorganisms in metabolism and recycling of carbon, nitrogen, sulfur and phosphorous compounds. 3- Role of microorganism as pathogen transmission and as microbial indicators for water and food pollution
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- To understand environmental microbiology, Components of Ecosystem (Environment), Some important terms in Environmental Microbiology 2- To know the types of Aquatic microbiology, Importance of aquatic microorganisms and microbial activity in water Column. 3- Understand the Role of Microorganisms in Metabolism of C and N compounds. 4- Understand Role of microorganisms in Phosphorous and Sulfur compounds metabolism. 5- Identifying the types and transmission rout of pathogens in water

	and waste water, Water borne diseases, Water-washed route, Water-based route, Insect vector route. 6- Understanding the role of microbial Indicators in assessment of water quality. 7- To understand the concept of Soil Microbiology and microbial interaction, major roles and activities of Bacteria in soil. 8- Illustrate the general types and characteristics of Actinomycetes, and study The relation of Actinomycetes to Fungi and bacteria as well clarify Activity and function of Actinomycetes in the Soil, 9- Identify the major roles of Fungi in soil environment, Roles and activities of Fungi in soil, 10- Diagnosis of Pathogens and Parasites in domestic waste water 11- Study the concept of Epidemiology and Chain of Infection, transmission of Pathogens and Parasites Found IN Domestic Wastewater. 12- Study the relations between microorganisms such as MICROBE–MICROBE INTERACTIONS. 13- Illustrate the concept of Symbiosis between Bacteria and Protozoa, Fungus–Bacterium Symbiosis, Prokaryote–Prokaryote Interactions 14- Concept of INTERACTIONS BETWEEN MICROORGANISMS AND ANIMALS, Microbe–Animal Interactions: Parasitism, Mutualism, Grazing and Predation by Animals
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following: Definitions of Environmental Microbiology, Components of Ecosystem (Environment). Aquatic microbiology, Importance of aquatic microorganisms, microbial flora and microbial activity in water Column. Role of Microorganisms in biogeochemical cycles (Metabolism of C and N compounds). Role of microorganism's in Phosphorus and Sulfur compounds metabolism. Water and Pathogens, Water borne diseases, classification of Water-associated diseases. Indicators of microbial water quality, Indicator Microorganism, Types of indicators. Soil Microbiology and microbial interaction, Soil Microflora, major roles of Bacteria in soil. Actinomycetes in the soil, Major groups of Actinomycetes, Activity and function of Actinomycetes in the Soil, antibiotics produced by Streptomyces spp. Fungi in soil environment, Common genera of Fungi in soil, Roles and activities of Fungi in soil, Pathogens and Parasites in domestic waste water Elements OF Epidemiology, Pathogens and Parasites Found IN Domestic Wastewater, MICROBE–MICROBE INTERACTIONS, Introduction, Classification of Microbial Interactions, Symbiotic Associations, Symbiosis between Bacteria and Protozoa, Fungus–Bacterium Symbiosis,

	Prokaryote–Prokaryote Interactions INTERACTIONS BETWEEN MICROORGANISMS AND ANIMALS, Microbe–Animal Interactions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the collection of different of water soil and clinical samples. Isolation and primitive identification according to the acquired skills from the theoretical and practical information through lectures and Lab.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.25
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 3, 5 , 8 and 12
	Assignments	2	10% (10)	2, 12	LO # 2, 4, 6 and 9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 3, 5, 6 and 9
Summative	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-7

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Definitions of Environmental Microbiology, the need to understand environmental microbiology, Components of Ecosystem (Environment), Some important terms in Environmental Microbiology
Week 2	Aquatic microbiology, Aquatic microorganisms obtain nutrition in a variety of ways, Importance of aquatic microorganisms, microbial flora and microbial activity in water Column, Metabolic Rate and Temperature, Factor affects the microbes in water such as temperature, gases, salinity
Week 3	Role of Microorganisms in biogeochemical cycles (Metabolism of C and N compounds), The Carbon Cycle, Biodegradation, Nitrogen Cycle, Nitrogen fixation, Ammonificant of N compounds, nitrification, denitrification
Week 4	Role of microorganisms P and S metabolism, Microorganisms in Phosphorus cycle, Microorganisms in Sulfur Cycle and Metabolism, Sulfur oxidizing and sulfur reducing bacteria, Characteristics of Sulfur-oxidizing and reducing prokaryotes are, Sulfate assimilation.
Week 5	Water and Pathogens, Water borne diseases, Main Sources of Water Microbial Pollution, Examples of waterborne diseases, classification of Water-associated diseases, A. Water-borne route, B. Water-washed route (Water shortage قلة او ندرة استخدام المياه), C. Water-based route (طرق انتقال الامراض بالاعتماد على المياه), D. Insect vector route ((طرق الانتقال عن طريق الحشرات
Week 6	Indicators of microbial water quality, Indicator Microorganism, Types of indicators, fecal coliform and total coliform, Fecal Streptococci, Current methods of detection Microbial indicators
Week 7	Mid-term Exam.
Week 8	Soil Microbiology and microbial interaction, Definition of soil environment, Soil Particles size and layers, Soil Living organic matter (Soil Biota or organisms), Soil Microflora, major roles of Bacteria in soil, Rhizosphere zone in soli, Microbial activity in rhizosphere zone.
Week 9	Actinomycetes in the soil, the general characteristics of Actinomycetes, the relation of Actinomycetes to Fungi, Distribution and abundance of Actinomycetes, comparison of Actinomycetes with the true bacteria, Environmental Influences on Actinomycetes in soil, Major groups of Actinomycetes, Activity and function of Actinomycetes in the Soil, Significance of Actinomycetes, Actinomycetes Antibiotics, antibiotics produced by Streptomyces spp.
Week	Fungi in soil environment, Environmental influences on the fungus in soil, Common genera of Fungi in soil, Yeast in soil, Roles and activities of Fungi in soil,

10	
Week 11	Pathogens and Parasites in domestic waste water Elements OF Epidemiology, Some Definitions, Chain of Infection, Pathogens and Parasites Found IN Domestic Wastewater, Bacterial Pathogens, Viral Pathogens, Protozoan Parasites, Helminth Parasites
Week 12	MICROBE–MICROBE INTERACTIONS, Introduction, Classification of Microbial Interactions, Symbiotic Associations,
Week 13	Symbiosis between Bacteria and Protozoa, Fungus–Bacterium Symbiosis, Prokaryote–Prokaryote Interactions
Week 15	INTERACTIONS BETWEEN MICROORGANISMS AND ANIMALS, Introduction, Primary and Secondary Symbionts, Microbe–Animal Interactions: Parasitism, Microbe–Animal Interactions: Mutualism, Microbial–Vertebrate Interactions, Grazing and Predation by Animals
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Introduction to microbiology
Week 2	Dilution and plating of bacteria and growth curve
Week 3	Preparation of microbiolovical culture media
Week 4	Isolation of fungi and Actinomycetes from soil
Week 5	Bacteriological test of water: the coliform MPN test
Week 6	Water quality standarda and Isolation of Some Water borne Pathogens
Week 7	Effect of environmental factors on microbial growth
Week 8	Biological Oxygen demand (BOD)
Week 9	Antibacterial activity of bioactive compounds produced by Streptomyces spp. Isolated from agricultural soil
Week 10	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Environmental Microbiology, second edition Waste water microbiology third edition Environmental biotechnology, second edition	Yes
Recommended Texts	Waste water microbiology third edition Environmental biotechnology, second edition	Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Nanobiotechnology	**Module Delivery**
Module Type	CORE	☐ **Theory**

Module Code	BIOT-1313		☐ **Lecture** ☐ **Lab** ☐ Tutorial ☐ Practical ☐ Seminar	
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	2	**Semester of Delivery**	4	
Administering Department	Biotechnology	**College**	College of Science	
Module Leader	Marwa Rashid	**e-mail**	phdjwameer@gmail.com	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**	E-mail	
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date		**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Biotechnology	**Semester**	
Co-requisites module	Principle of biotechnology	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. This course deals with the basic concept of nanotechnology 2. To understand the important of nanotechnology and its applications in biotechnology.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To know the definition and history of nanotechnology 2. To know the new properties of nanomaterilas 3. To Describe the different methods of synthesis nanomaterials 4. To know the types of nanomaterials

	5. Explain the characterization of nanomaterial by using different techniques 6. Explain Direct methods of characterization 7. Explain indirect methods of characterization 8. Determine the applications of nanotechnology in different aspects 9. Applications of nanotechnology in biomedical field 10. Learning about the toxicity and how can be reduced it
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following:- -Introduction, history different between micro and nan scale - Understand various chemical and physical methods for the synthesis of nanomaterials -information on the specific details of both bottom up and top-down synthesis - Understand various biological methods for the synthesis of nanomaterials -Classification of nanomaterials ,metal and organic nanomaterials - Understand phase rule/phase diagrams -Coating thin-film metals and semiconductors using different methods -The principle and working of UV -Vis absorption spectroscopy relation of absorption peak of metal nanoparticles with size and shape changes and SEM ,TEM and AFM techniques.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	.Visualization, Teamwork Cooperative Learning, Differentiated Instruction Using new Technology, Student-led Classroom: ,Student Centred Inquiry and Professional Development

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

As		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to the course
Week 2	Historical perspective of micro and nano scale
Week 3	Nano manufacturing technology, Advantages and applications of nanotechnology
Week 4	Nano manufacturing technology, Advantages and disadvantages
Week 5	Overview of Nano Fabrication Methods: Top-down and bottom-up approaches
Week 6	Types of nanomaterials organic and inorganic nanomaterials
Week 7	MID TERM EXAM
Week 8	Quantum dots, etc., Organic compounds and bio-applications of nano materials
Week 9	Characterization Tools, Optical microscopy and Spectrophotometer, Scanning Electron Microscope, AFM
Week 10	Application of nano materials, Carbon Nano Tubes
Week	Nanopharmaceuticals and Nanomedical Device

11	
Week 12	Bioengineered Nanomaterials
Week 13	Nanosensors
Week 14	Nanotoxicology
Week 15	Nanobiotechnology and Tissue Engineering
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Introduction
Week 2	Lab 2: Synthesis Metal Nanoparticles
Week 3	Lab 3: Synthesis of nanomaterials by chemical method
Week 4	Lab 4: Synthesis of nanomaterials by physical method
Week 5	Lab 5: Synthesis of nanomaterials by biological method
Week 6	Lab 6: Nanomaterial characterization techniques
Week 7	Lab 7: Biological bio-medical applications: Antibacterial activity test
Week 8	Lab 8: Antifungal activity test
Week 9	Lab 9: Nanosensers
Week 10	Lab 10: nanocomposites

Learning and Teaching Resources مصادر التعلم والتدريس		
		Available in the Library?
Required Texts	Textbook of Nanoscience Nanotechnology B S Murty, P Shankar, Baldev Raj, B B Rath and James Murday.2013	

Recommended Texts	Nanomaterials in Bionanotechnology: Fundamentals and Applications. Singh and Kshitij RB Singh.ISBN: 9780367689445.2021	
Websites	file:///C:/Users/Toshiba/Downloads/TextbookofNanoscienceandNanotechnology.pdf https://web.pdx.edu/~pmoeck/phy381/intro-nanotech.pdf	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 – 100	Outstanding Performance
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	C – Good	جيد	70 – 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	Biochemistry1			Module Delivery
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	BIOT-1314			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGx11 2		Semester of Delivery	3
Administering Department	Biotechnology		College	College of Science
Module Leader	Ibtihal Sabri		e-mail	dr.ebtehal@uodiyala.edu.iq
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	Ph.D
Module Tutor	Assel Faiq		e-mail	aseelaa084@gmail.com
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date	01/06/2025		Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Aims of biochemistry to study biomolecules and their components such as enzymes, proteins, hormones, antibiotics, and organic acids, and to

	identify their importance and role in the bodies of living organisms and to exploit them in diagnosing and treating diseases and abnormalities that afflict livingthings 2- Acquisition of practical, scientific, and laboratory information about the basics of biochemistry, which plays a very large role in the medical and pharmaceutical sectors and in many very important jobs. These fields or specializations include the industrial, health, academic, and many other fields. 3- Identify chemical compounds and understand the biochemical reactions that take place in the human body. 4- Understanding of the chemical properties of biomolecules and the ability to use and combine biochemical techniques with genetics and physical biology techniques as well as molecular biology. 5- The ability to diagnosis of diseases through blood indicators and give the ability to understand normal and pathological phenomena in the human body through theoretical and practical lessons. 6- Conducting advanced research in the fields of basic and clinical biochemistry that Serve the community.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Learn what is carbohydrate and its importance, Carbohydrate is the nutritional component that gives energy. 2- Classification of carbohydrates, Hemiacetal formation of monosaccharide structure 3- Draw Haworth and Chair projection for Glucose and Fructose from Fischer projection, Formation of alpha and beta glycosidic linkages in disaccharides and polysaccharides. 4- General idea about lipid structure and properties. Classify lipids, Understanding the major physiological functions of fatty acids. 5- Understanding the structure of saturated or unsaturated fatty acids and study the relation between the structure and function of fatty acids. 6- Learning about amino acids, their structure, and types. 7- Identify how amino acids form proteins and Define essential and nonessential amino acids. 8- Distinguish between different types of amino acids and Detection of functional groups in amino acids. 9- Understanding the Solubility of amino acids and proteins and solubility as a function of solution PH. 10- Understanding the denaturation and Adaptation denaturation of Protein Altering protein’s 3 dimensional structure.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following. Carbohydrate: properties of Carbohydrate. Classification of Carbohydrate (Monosaccharide's - Disaccharides, Polysaccharides), derivatives of monosaccharide's. Lipids : - Classification of lipid , saturated and unsaturated fatty acids , Essential fatty acids , Phospholipids , Cholesterol. Amino acids : Classification of Amino Acids , Properties of Amino Acids ,

	Glutathione. Proteins : classification Based on Functions , Physical and chemical properties. Structure of Proteins , Denaturation of Proteins.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Biochemistry teaching strategy for biotechnology specialty students, conducted through an improved lecture format with a brief content and multimedia courseware. This is done By using the brainstorming method, , and using the discussion method to stimulate thinking and participation of students and to provide an opportunity for questions and discussion, while respecting their opinions and suggestions, and this method helps in developing the student's personality cognitively, emotionally and skillfully. Also using the methods of thinking maps, it is an effective teaching strategy in representing knowledge through schematic forms that link concepts to each other. Concept maps are used to present new information, discover relationships between concepts, deepen understanding, summarize information, and evaluate the lesson. Encouraging students to prepare reports and present seminars with conducting tests to assess students' understanding and levels.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 5
	Projects /	1	10% (10)	Continu	All

	Lab.			ous	
	Report	1	10% (10)	13	LO # 5, 9 and 10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Carbohydrate- difination and classification
Week 2	Physical and chemical properties of Charbohydrate
Week 3	Monosaccharide's , isomerism , derivatives of monosaccharides
Week 4	Disaccharides , classification of disaccharides
Week 5	Polysaccharides , , classification of polysaccharides
Week 6	Lipids – Definition - Properties – Classification
Week 7	Midterm Exam
Week 8	Simple Lipids , Essential fatty acids , saturated and unsaturated fatty acids
Week 9	Compound Lipids - Phospholipids , sphingolipids, Cholesterol
Week 10	Amino acids - Classification of Amino Acids
Week 11	Properties of Amino Acids , Biologically Important Peptides , Glutathione
Week 12	Proteins - difination and classification Based on Functions
Week 13	classification Based on Physical and chemical properties (Simple proteins - Conjugated proteins and Derived proteins
Week 14	Structure of Proteins , Denaturation of Proteins
Week 15	**Preparatory week**
Week	**final Exam**

16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Chemical laboratory safety.
Week 2	Lab 2: Methods expressing concentration.
Week 3	Lab 3: General test for carbohydrates, reducing tests, pentose's test and ketoses test of sugars.
Week 4	Lab 4: Osazones test, sucrose test, polysaccharides test and hydrolysis of starch.
Week 5	Lab 5: Qualitative tests of lipids.
Week 6	Lab 6: Quantitative tests of lipids.
Week 7	Lab 7: Ninhydrin test, xanthoprotic test, Millon test, glyoxylic test.
Week 8	Lab Lead sulphide test, Nitroprusside test, sakaguchi test.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to general organic and biochemistry University of Illinois, Urbana-Champaign	Yes
Recommended Texts	Lippincott's Illustrated Reviews: Biochemistry ESSENTIALS OF BIOCHEMISTRY Pankaja Naik PhD ,Professor and Head Department of Biochemistry, MVPS Dr Vasantrao Pawar Medical College Nashik, Maharashtra , India	No
Websites	http://www.schoolarabia.net/kemya/kymia_hyatia/main.htm	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	**B** - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Animal physiology			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	BIOT-1315				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGx11 2		**Semester of Delivery**	3	
Administering Department	Biotechnology		**College**	College of Science	
Module Leader	Massar Hadi		**e-mail**	Masarhadi@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		

Module Tutor	**Vean Ahsan**	**e-mail**	**veanahsan44@gmail.com**
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Histology, Microtechnique , cytology	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide a course of study in mammalian, principally human, systems physiology, introducing students to the principles of normal biological function in the Human body 2. To explore the fundamental concepts of human physiology from cellular functions through to systems that are responsible for homeostasis. 3. To prepare students for subsequent biological courses that require an understanding of the physiology of the Human body 4. To understand how human maintains an internal steady state, how they acquire nutrients, and how they detect and respond to changes in their environments 5. To develop practical biological skills principally Physiology, Development & Neuroscience, but also Pharmacology, Pathology, and Zoology, among others.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the course, students should: 1. Have an enhanced knowledge and appreciation of mammalian physiology 2. Understand the functions of important physiological systems including the cardio-respiratory, renal, reproductive, and metabolic systems 3. Understand how these separate systems interact to yield integrated physiological responses to challenges such as exercise, fasting, and ascent to high altitude, and how they can sometimes fail 4. be able to perform, analyses, and report on experiments and observations in physiology 5. be able to recognize and identify principal tissue structures 6. Be familiar with the safe use and application of some of the basic laboratory equipment used in physiological studies of animals
Indicative Contents	Indicative content includes the following. • Physiology: Definitions, Methods of Physiology

المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	• Homeostasis, mechanisms, examples • Nervous systems, neuron types, myelin • Impulse formation, synapses • Muscular system, types, sarcomere, contractile filaments • Sliding theory, neuromuscular junction, muscle twitch • Circulatory system, heart, vessels, valves, heart sounds • Heart circuits, heart rate, conduction system • Respiratory system, lung, alveoli, respiratory volumes • Urinary system, kidney, nephrons, urine formation • Filtration, Reabsorption, secretion • Digestive system, stomach, mechanical, chemical digestion, • Digestive enzymes, liver, pancreas • Endocrine system, hormones, pheromones

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 the following: - Providing students with the basics and additional topics related to the pre-skills education outcomes to solve scientific problems -Solve a set of practical examples by the academic staff -Students' participation during the lecture to solve some scientific issues - Summer training

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

As		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to physiology, scientific method, measurements, history of physiology, homeostasis, Homeostatic mechanisms
Week 2	Nervous system , the function of NS, Division of NS, Neuron (structure and types) , supporting cells (types and function) , myelin
Week 3	Electrical activity of nerves, impulse formation, active potential, resting potential ,refractory period , synapses electrical – gap junction- , chemical synapses, neurotransmitters (types , functions)
Week 4	Muscular system, types of muscles (skeletal , cardiac,smooth0 (structure and function) , sarcomere (structure and function) ,
Week 5	muscle contraction mechanism, Motor unit isometric and isotonic contractions, muscle fatigue muscle fuels
Week 6	Circulatory system, (cardiovascular system and lymphatic system), Arteries, and veins, (pulmonary circuit and systemic circuit) function of circulatory system , role of capillaries , blood flow.
Week 7	**MID TERM EXAM**
Week 8	Heart (structure and function) , Heart chambers and valves , cardiac cycle , heart sounds , heart murmers , electrical activity of heart , conduction system , pulse , blood pressure , cardiac output , control of h8eart rate.

Week 9	Respiratory system , component of RS , lung , function of RS, Respiration , Cellular respiration , breathing (external and internal respiration) , factors of normal respiration , breathing cycle , inspiration and expiration mechanism , respiratory values ,
Week 10	Gas exchange between alveoli and blood and between blood and tissue , respiratory quotient , gas transport , respiratory pigments, Alveolar ventilation ,exchange of gases, composition of air and partial pressure of gases ,transport of gases in the blood stream (O2,CO2)
Week 11	Urinary system, (structure and function), kidney (structure and function), nephron, glomerular filtration, rate of glomerular filtration, measurements using inulin, absorption of material in each part of the nephron, tubular secretion, nervous and hormonal regulation of kidney function, calcium balance, pH balance, sodium and potassium balance, water balance, the composition of urine,anti-diuretic hormone.
Week 12	Digestive system, structure and function of DS, phases of digestion, Stomach, HCl formation, Small intestine, villi, large intestine,
Week 13	auxiliary glands, gall bladder, bile acids, bile pigments, bilirubin, biliverdin, liver
Week 14	Endocrine glands: pituitary, thyroid, adrenal, pancreas,
Week 15	The preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Lab 1:	**Material Covered**
Week 1	Lab 1: Hematology. Blood collection &
Week 2	Lab 1:Anticoagulants
Week 3	Determination of Hb,
Week 4	Lab 1:Determination of ESR
Week 5	Lab 1:Determination of bleeding time & clotting time
Week 6	Lab 1:RBC count,
Week 7	Lab 1:WBC count
Week 8	Exam
Week 9	Lab 1:Differential count of WBC
Week 10	Lab 1:Blood group & Rh typing
Week 11	Determination of Blood pressure

Week 12	Lab 1:Blood disease
Week 13	Lab 1:Fragility test
Week 14	Lab 1:Liver function tests
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Human Physiology/ Stuart Iron Fox/2004 أساسيات علم الفسلجة / عبد الرحيم عشير وصباح ناصر العلوجي	Yes
Recommended Texts	A textbook of practical physiology, 2013 (8th edition) ENDOCRINE SECRETS, 6th ed., Michael T. McDermott,2013	No
Websites	https://en.wikipedia.org/wiki/Physiology https://www.medicalnewstoday.com/articles/248791	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-	Considerable amount of work

			44)	required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Semester FOUR

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Microbiology 2			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	BIOT-1416				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGx11 2		**Semester of Delivery**	4	
Administering Department	Biotechnology		**College**	College of Science	
Module Leader	Hiba Ali		**e-mail**	Hiba.a@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Pathogenic bacteria, mycology, immunology and virology.	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. **Enable students to obtain knowledge and understanding of microbiology.** 2. **Providing students with basics and topics related to all branches of microbiology.** 3. **This course deals with the basic concept of microbiology.** 4. **Improving students' skills in scientific research and providing them with basic skills in conducting scientific research and all applications related to microbiology.** 5. **Preparing specialized students familiar with the basics of microbiology, theoretically and practically, who are able to meet the needs of the labor market.** 6. **To develop practical microbiological skills principally diagnosis of causative agents of the infections and diseases of humans and Zoology in additions to learning the ways to controlling and overcome the healthy problems.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. **After taken this course the students can recognize all branches of microbiology and Enhancing their knowledge about them.** 2. **List the various terms associated with microbiology.** 3. **Summarize what is meant by microorganisms and their relation to our life.** 4. **Discuss the most details of microorganisms and their involvement in many other fields such as healthy, ecology, epidemiology, industry and etc.** 5. **Be able to describe, recognize and identify the causative structures, shapes and their sizes and arrangement and other details.** 6. **Identify the basic requirements and ingredients for each pathogen invaders.** 7. **Be familiar with the using of the safe application of some of the basic laboratory equipment that's applying in microbiological studies and researches.** 8. **Also be familiar with different strategies for preventing all forms of contamination during the work in the lab. and how can the controlling it.**
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	**Microbes in our Lives:** History of Microbiology, Naming and Classify Microorganism Bacteria, Fungus ,Protozoa ,Algae, Virus **Supplies and Growth of microbes:** The Supplies for Growth Physical elements Chemical and selective ,minimal ,enrich media - Types of Chemical principle bonds, PH ,buffer, oxidation **Physiology and Metabolism of the bacteria** Microbial metabolism: Is the means by which a microbe obtains the energy and nutrients (e.g. carbon) it needs to live and reproduce

	Microbial Genetics: Structure and replication of DNA Genetic Transfer and Recombination Transformation, Conjugation,Transduction Principles of Diseases: Pathology, Normal Flora Infection and Disease and Opportunists Hosts, Nosocomial Infections, Transmission, Reservoirs **Antimicrobial agents:** Types of antimicrobial agents ,antibiotics ,bacteriocine source of isolates

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11

assessment	**Assignments**	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Introduction and history of microbiology**
Week 2	**Eukaryotes and prokaryotes cells. -** **Bacterial cell structure and their function -**
Week 3	**Growth and Nutrition of the bacteria.**
Week 4	**Physiology and Metabolism of the bacteria.**
Week 5	**Bacterial virulence and pathogenesis.**
Week 6	**Sterilization and disinfection.**
Week 7	**Mid-term Exam.**
Week 8	**Antibiotics and chemotherapeutic agents.**
Week 9	**Bacterial genetics.**
Week 10	**Mycology / introduction.**
Week 11	**Fungi Structure, growth, nutrition and reproduction.**
Week 12	**Classification and pathogenesis.**
Week 13	**Fungal infection and their causative agents. (included three lectures).**
Week	**Fungal infection and their causative agents.**

14	
Week 15	**Fungal infection and their causative agents.**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: **Biosafety procedure, precautions and Microscope.**
Week 2	Lab 2: **Tools, instruments and equipment.**
Week 3	Lab 3: **Staining methods of bacteria.**
Week 4	**Lab 4: Acid fast stains** **(Ziehl – Nielson technique) and special stains.**
Week 5	Lab 5: **Capsule stain and their types.**
Week 6	Lab 6: **Examination.**
Week 7	Lab 7: **Culture media, preparation and their types.**
Week 8	**Lab.8: Growing and Cultivation of the bacterial species in the lab.**
Week 9	**Lab. 9: - Cultivation of the bacteria in the liquid media (broth) / Motility tests**
Week 10	**Biochemical test.**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Jawetz, Melnick and Adellberg's. (2011). Textbook of Medical Microbiology.26th Edition. .2	Yes
Recommended Texts	2. Connie,R. Mahon; Donald, C. Leham and George Manguselis. (2011): Text book of Diagnostic Microbiology. Fourth edition.	No

Websites	https://www.microbiologyresearch.org - https://microbiologysociety.org/why-microbiology-matters/what-is-microbiology.html -

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Biological Control	**Module Delivery**
Module Type	Core	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical
Module Code	BIOT-1417	
ECTS	5	

Credits			☒ Seminar	
SWL (hr/sem)	125			
Module Level	UGx11 2		**Semester of Delivery**	4
Administering Department	Biotechnology		**College**	College of Science
Module Leader	Maryam Abdulsalam		**e-mail**	Mariamabdul_salam@uodiyala.edu.iq
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)		**e-mail**	E-mail
Peer Reviewer Name	Name		**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1- To learn the general concepts of biological control and the important organisms involved in it. 2- This course deals with the basic concepts of natural control, pests, natural enemies (biological control agents). 3- To identify the strategies of biological control. 4- Understand the general methods of pest control. 5- To identify the Interactions between plants and beneficial microbes. 6- To understand the microbial insecticides 7- This course deals with the biological control of different plant pathogens (Bacteria, Fungi, Nematodes, filamentous Algae, and weeds). 8- To develop skills for detecting microorganisms that cause plant diseases.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Enable students to obtain knowledge and understanding of biological control. 2- List the various terms associated with biological control. 3- Learn about traditional control methods and modern methods of pest control. 4- Discuss the general advantages and limitations of biological control. 5- Summarize the biological control strategies. 6- Describe the most important organisms used in the control of insects, nematodes, algae, weeds, and fungi and their mechanisms of action. 7- Discuss the use of bacteria, their metabolic products, or their spores, to control other organisms that cause economic damage. 8- Explain the use of fungi, their products to control other organisms that cause economic damage. 9- Discuss the use of insects to control other organisms that cause economic damage. 10- Explain the use of nematodes to control other organisms that cause economic damage.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following. <u>Part A – General concepts</u> Introduction to Biological Control – Important Terms, What is biological pest control?, General Advantages and Limitations of Biological Control, Natural Control, Pests, Natural enemies(Biological Control Agents), Strategies of Biological Control, Properties of Classical Biological Control, The general methods of pest control, Interactions between Plants and Beneficial Microbes. [20 hrs] <u>Part B -The Insecticides</u> Microbial Insecticides- Microbial Insecticides (Advantages and Disadvantages), Bacterial insecticide, Fungi as Agents of Biocontrol. [18 hrs] <u>Part C - Biological Control of Pathogens</u> Biological Control of Plant Pathogens- Biological control of Nematodes, Biological control of filamentous Algae, Biological control of weeds. [22 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 type of

	simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**

Week 1	Important Terms in Biological control
Week 2	Introduction, What is biological pest control?, General Advantages and Limitations of Biological Control, Natural Control, Pests, Natural enemies
Week 3	Strategies of Biological Control, Properties of Classical Biological Control
Week 4	The general methods of pest control
Week 5	Interactions between Plants and Beneficial Microbes
Week 6	Microbial Insecticides (Advantages and Disadvantages), Bacterial insecticide(P1)
Week 7	MID TERM EXAM
Week 8	Microbial Insecticides (Advantages and Disadvantages), Bacterial insecticide(P2)
Week 9	Fungi as Agents of Biocontrol
Week 10	Biological Control of Plant Pathogens
Week 11	Biological control of Nematodes(P1)
Week 12	Biological control of Nematodes(P2)
Week 13	Biological control of filamentous Algae
Week 14	Biological control of weeds
Week 15	**Preparatory week before the final Exam**
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Definition, History and development, Classical examples, Factors governing biological control
Week 2	Lab 2: Five Major Types of Species (Natural enemies)
Week 3	Lab 3: Interactions; Examples of Symbiotic Species, Parasitism, Mutualism,

	Commensalism, Competition,
Week 4	Lab 4: Sampling Methods and Tools
Week 5	Lab 5: Mid Exam 1
Week 6	Lab 6: Biological Control of Weeds
Week 7	Lab 7: Biological Control of Nematodes
Week 8	Lab 8: Biological control of Fungi
Week 9	Lab 9: Biological control of filamentous Algae
Week 10	Lab 10: Biological Control of Plant Pathogens
Week 11	Lab 11: Mid Exam 2

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Biological Control: Benefits and Risks. 1995. Heikki M. T. Hokkanen and James M. Lynch. Cambridge, University Press. - Biological Control A Global Perspective. 2007. Charles Vincent, Mark S.Goettel, and George Lazarovits. CABI, UK, USA.	No
Recommended Texts	- Plant Defence: Biological Control. 2012. Jean Michel Merillon & Kishan Gopal Ramawat. Springer, Dordrecht Heidelberg London New York -Trophic and Guild in Biological Control. 2006. Jacques Brodeur and Guy Boivin. Springer. Dordrecht, The Netherlands.	No
Websites	https://biocontrol.entomology.cornell.edu/links.php https://cals.cornell.edu/new-york-state-integrated-pest-management/eco-resilience/biocontrol https://www.youtube.com/channel/UCJlzzBwuorwLbviAhEgbnqQ	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success	**A -**	امتياز	90 -	Outstanding Performance

Group (50 - 100)	Excellent		100	
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية				
Module Title	**Computer Skills 2**		**Module Delivery**	
Module Type	**Basic**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**UD13**			
ECTS Credits	**3**			
SWL (hr/sem)	**75**			
Module Level	UGx11 1		**Semester of Delivery**	2
Administering Department	Computer		**College**	College of Science
Module Leader	Ismael Salih Aref		**e-mail**	asmaelsalihl@uodiyala.edu.iq
Module Leader's Acad.	Lecturer		**Module Leader's**	Ph.D.

Title		**Qualification**	
Module Tutor	Qusay Kannan Kadium	**e-mail**	Dr.qusay.kanaan@uodiyala.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• This module sets out essential concepts and skills relating to the use of devices. • This module covers the key skills and main concepts relating to computers, devices, file creation and management, web browsing, and data security. Help students to demonstrate the ability to use word processing formatting, finishing small-sized word processing documents, such as letters and other everyday documents. • Help students to demonstrate the ability to use a power point application to accomplish tasks associated with creating, and formatting a presentation. • Help students to demonstrate the ability to use Excel application to accomplish a spreadsheet for tasks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, a student will be able to: 10. Understand key concepts relating to computers, devices and software. 11. Identify the main types of Integrated and External equipment 12. Understand concepts of online communities, communications and e-mail 13. Adjust the main operating system settings and use built-in help features. 14. Know about the main concepts of file management and be able to efficiently organize files and folders. 15. Create a report by Ms. Word document and print an output. 16. Use University email to Collaborate inside and outside university and How to participate in video conference using meet 17. Create a presentation using power point application.

	18. Create a spreadsheet using Excel application.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: - The general purpose computer model: All types of computers follow the same structure and perform the basic operations (Input, Processing, Output, Storage and controlling) to converting raw input (data) to information. - Components of a computer Hardware: Each computer consists of Hardware and software. The Hardware includes input devices, output devices, system units, storage devices, and communication devices. - System Units (Internal & External components of system units): The internal component of the system units is consists of (CPU, Motherboard, RAM, Ports, Hard disk …). - Central Processing Unit: ALU, CU, and memory unit. - Memory and its Types ▪ Cache Memory ▪ Primary memory –Comparison between RAM & ROM ▪ Secondary Storage - Ports and their types (Ports: is a connection points used as an interface between the computer and its peripheral devices (Serial ports, Parallel ports, PS/2, USB, VGA …)). - Input Devices (Keyboard, Mouse, …) - Output Devices (Printer, speaker, monitors, …) - Software Types of Software ▪ Operating System (Windows, Linux, …) ▪ Application Software & their types ▪ Programming Languages (Low, Assembly, High level). Internet, Benefits, Browsing the Web (Web Browser) , Search the web (search - Communication Technology: It plays an important role in almost every activity that we performed. The best examples of Communication technology includes:blogs, Web sites, live video, social media technology, and E-mail communication. - E-mail: free e-mail providers (G-mail, Yahoo-mail, …), send and receive E-mailoperation, send e-mail with attachment, checking the e-mail boxes (inbox, sendbox, spam …). - Security and keeping information safe: protect the information from unauthorized access and prevent use, modification, and destruction of thisinformation. - Virus transmission ways to the computer: by e-mail, Downloading from the Internet, Pirated software, Exchange of diskettes, in attached e-mail, and indocuments. - Protection against viruses: install good anti-viruses. - Antivirus, benefits and Types Introduction to windows - Desktop Components: (Icons, Start, task bar …)

	- The start menu (its functions and properties) ▪

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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. Different forms of teaching will be used to reach the objective of this module, including power point presentation for the subjects which contains titles, definitions, summary and conclusions, whiteboard will be used and classroom discussion with assignments, the students will be asked to prepare papers on selective topics.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	26	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 4 and 6
	Assignments	2	10% (10)	2, 12	LO # 3, 4 and 6
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 6
Summative	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-7

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computers – definition -The purposes of using a computer. -The general purpose computer model. -The difference between Data and Information concepts.Introduction to windows - Desktop Components - The start menu (its functions and properties)
Week 2	The Components of a computer: Hardware - System Units (Internal & External components of system units) - Central Processing Unit (Features and components)Windows: - Task bar and its functions and properties
Week 3	- Memory and its Types ▪ Cache Memory ▪ Primary memory –Comparison between RAM & ROM ▪ Secondary StorageWindows: - Files and Folders: All operations on files and folders (selection, creation, saving, moving andrenaming.
Week 4	Ports and their types - Input Devices, - Output Devices Windows: - Delete Files. - Recycle bin. - Creating a Shortcut. - Desktop Icons. - The Windows Explorer Views. - Sort files.
Week 5	- Software Types of Software ▪ Operating System ▪ Application Software & their typesProgramming Languages Windows: -Customizing the desktop. -Change screen resolution. - Change Desktop Background
Week 6	- Communication Technology - E-mail

	Windo ws: - Print Screen - Cleaning Up the Disk - Defragmenting the Disk **Quiz (1, 2, 3, 4, 5) -Windows only**
Week 7	- Internet, Browsing the Web (Web Browser) , Search the web (search engine) - Security and keeping information safe -Virus transmission ways to the computer -Protection against viruses -Antivirus, benefits and Types
Week 8	**Mid Exam**
Week 9	Microsoft Word - - Word Program Interface -Keyboard Shortcuts in Microsoft Word -The operations on Text - File Menu Home Tab & it commands - Insert Tab (Pages & tables Groups) - Table Tools
Week 10	Microsoft Word - Insert Tab (Illustrations, Header & Footer, Text and Symbols Groups) - Page Layout, References, Review Tabs **Quiz (Week 8, 9)**
Week 11	Microsoft PowerPoint - PowerPoint program Interface. - File Menu - Home Tab & it commands - Operations on the Slides (duplicate, Delete, and Move)
Week 12	Microsoft PowerPoint - Insert Tab, Design Tab, Slide Show Tab and their commands - Transitions, and Animations Tabs
Week 13	Microsoft Excel - File Menu, Home Tab & it commands
Week 14	Microsoft Excel - Excel Worksheet Basics - Cell format
Week 15	**Preparatory Week**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	3. M. E. Vermaat and G. B. Shelly, *Discovering Computers Fundamentals: Living in a Digital World,*Shelly Cashman, 2011 Edition. 4. J. Lambert, J. Cox , and C. Frye, *Microsoft*	E-Copy

	OfficeProfessional 2010 Step by Step , 1'st Edition, Microsoft Press, 2010, 152P.	
Recommended Texts	and C. Herrera**, *Introduction to Computers*** D. Hajek ***2022 Edition,*** Independently published, May 19, 2022,255P.	NO
Websites	11. https://theictbook.com/components-of-the-system-unit-and-their-functions/ 12. https://www.tutorialspoint.com/computer_fundamentals/index.htm 13. https://www.slideshare.net/Jamjolojessa/types-of-application-software?from_action=sav 14. https://www.bbc.co.uk/bitesize/guides/zbfny4j/revision/1 15. https://generalnote.com/Computer-Fundamental/ 16. https://edu.gcfglobal.org/en/word2010/# 17. https://edu.gcfglobal.org/en/powerpoint2010/# 18. https://edu.gcfglobal.org/en/excel2010/# 19. https://antivirus.comodo.com/blog/computer-safety/what-is-antivirus 20. https://thingscouplesdo.com/what-is-the-antivirus-software-that-is-best-for-a- user	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة

Module Information معلومات المادة الدراسية					
Module Title	اللغة العربية**2**			**Module Delivery**	
Module Type	**Support**			**Theory** **Lecture** Lab Tutorial Practical **Seminar**	
Module Code	**UNI-1212**				
ECTS Credits	2				
SWL (hr/sem)	**50**				
Module Level	UGx11 2		**Semester of Delivery**	4	
Administering Department			**College**	College of Science	
Module Leader	Othman Khlan Farhan		**e-mail**	othaman@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name(if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite	None	**Semester**	

module			
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	**1- تعريف الطلبة اهم المفاتيح الأساس في التعامل بلغة عربية فصيحة خالية من اي خطأ أو لحنٍ وكيفية التعلم فيما يخص الأدب والنحو والبلاغة والاملاء العربية وكل هذا لغير الاختصاص.** **2- رفع القدرات التعبيرية للطالب، وزيادة ثروتهم اللغوية ، ومساعدتهم على استخدام العبارة المناسبة بشكل دلالي واضح.** **3-تدريب الطلبة على التحدث، والتنظيم المنطقي للأفكار، مع الحرص على التمسك باللغة العربية الفصحى .** **4- رفع الأداء اللغوي العام لدى الطلبة.** **5- تمكين الطلبة من الكتابة والتعبير والحديث بلغة عربية فصيحة وواضحة.** **6- مساعدة الطلبة في التعبير عن افكارهم من خلال المناقشة والحوار بلغة سهلة وفصيحة .** **7- جعل الطلبة قادرين على اكتساب خزين لغوي من الكلمات واللفاظ والتعابير الفصيحة.** **8- تعلم الطلبة الحفاظ على لغة القرآن التراث العربي الاصيل.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**الاهداف المعرفية والمهارية:** **1- يعرف اساليب اللغة العربية.** **2- يوظف ادوات الترقيم عند الكتابة .** **3- يتدرب على كيفية تحليل النصوص الادبية .** **4- يعرب بعض الامثلة والتمارين عن الجملة الاسمية والفعلية .** **5-يناقش بعض النصوص القرآنية والادبية .** **6- يبين الفرق بين علامات الاعراب الاصلية والفرعية.** **7- يميز بين الافعال والاسماء في الجمل.** **8– يتدرب على القراءة الواضحة والإلقاء .** **9- يتدرب على الكتابة بخط حسن من خلال التعريف بأنواع الخطوط العربية، وكتابة كل حرف، ثم كتاب الجمل والعبارات بخط الرقعة.** **10- يميز بين حمزة القطع وهمزة الوصل عند الكتابة .** **11- يتعلم اساليب التحدث أمام الآخرين مع استعمال التأشير باليد والعين والجسد بما يتناسب مع الكلام .** **12- يميز بين حرفي الضاد والظاء في الكتابة والنطق.** **13- يميز بين التاء المربوطة والمفتوحة اثناء الكتابة.**
Indicative Contents المحتويات الإرشادية	توضيح أهمية اللغة العربية وفوائدها بالنسبة للطالب الجامعي (2 ساعة). اللغة، حفظ وتفسير وتحليل أول عشرة آيات من سورة الكهف مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية. (2 ساعة) اللغة، حفظ وتفسير وتحليل ثلاثة آيات من سورة الحجرات مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.(2 ساعة) الادب، حفظ وتحليل ثلاثة عشر سطراً من قصيدة سفر ايوب في الشعر الحر للشاعر العراقي بدر شاكر السياب مع حياة الشاعر واهم الاوجه البلاغية والنحوية في القصيدة.(2 ساعة) الادب، حفظ وتحليل ثمانية ابيات في الحماس للشاعر ابي الطيب المتنبي مع حياة الشاعر مع اهم الاوجه البلاغية والنحوية في القصيدة.(2 ساعة) قواعد اللغة العربية وأهميتها

	معرفة اقسام الكلام(الاسم والفعل والحرف)واهم علاماتها. قواعد اللغة العربية :- النكرة والمعرفة، انواع المعارف(العلم) شرح موضوع (اسم العلم والاسم المركب) (2 ساعة).مع الأمثلة (2 ساعة).قواعد اللغة العربية، (الضمائر)شرح موضوع(ضمائر الرفع والنصب والجر) مع الامثلة اللغة، حفظ وتفسير وتحليل سورة الاعلى مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية. الادب، حفظ وتحليل ثمانية ابيات من قصيدة (كن بلسما) للشاعر (ايليا ابي ماضي)مع حياة الشاعر مع اهم الحالات الاعرابية والبلاغية. (2 ساعة) قواعد اللغة العربية، شرح موضوع (اسماء الاشارة) مع الأمثلة وحالات الاعراب، شرح موضوع (المعرف بالإضافة) مع الأمثلة وحالات الاعراب (2 ساعة). قواعد اللغة العربية، شرح موضوع (الحال)معرفة الحال وصاحبها وما هي انواع الحال مع الأمثلة وحالات الاعراب (2 ساعة). (2 ساعة).الأملاء في اللغة العربية، علامات الترقيم واهميتها في اللغة العربية قواعد اللغة العربية، شرح موضوع (العدد)معرفة تميز العدد وماهي اقسام العدد مع الأمثلة وحالات الاعراب.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- **المحاضرة والمشاركة.** - **المناقشة والحوار.** - **العصف الذهني.** - **كتابة التقارير عن الموضوع.** - **السؤال والجواب.**

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية				
As	**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	1	10% (10)	5	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	توضيح أهمية اللغة العربية وفوائدها بالنسبة للطالب الجامعي. اللغة، حفظ وتفسير وتحليل أول عشرة آيات من سورة الكهف مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.
Week 2	اللغة، حفظ وتفسير وتحليل ثلاثة آيات من سورة الحجرات مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.
Week 3	الادب، حفظ وتحليل ثلاثة عشر سطراً من قصيدة سفر ايوب في الشعر الحر للشاعر العراقي بدر شاكر السياب مع حياة الشاعر واهم الاوجه البلاغية والنحوية في القصيدة. الأدب، حفظ وتحليل ثمانية ابيات من قصيدة (ابى الدهر)للشاعر محمود سامي البارودي.
Week 4	الادب، حفظ وتحليل ثمانية ابيات من قصيدة(الحماسة) للشاعر ابي الطيب المتنبي مع حياة الشاعر مع اهم الاوجه البلاغية والنحوية في القصيدة.
Week 5	قواعد اللغة العربية وأهميتها معرفة اقسام الكلام(الاسم والفعل والحرف)واهم علاماتها. النكرة والمعرفة، انواع المعارف(العلم) شرح موضوع (اسم العلم والاسم المركب) مع الأمثلة.
Week 6	قواعد اللغة العربية، شرح موضوع(المبتدأ والخبر) تقديم وتأخير المبتدأ والخبر ، وماهي انواع الخبر.
Week 7	قواعد اللغة العربية، (الضمائر)شرح موضوع(ضمائر الرفع والنصب والجر) مع الامثلة.
Week 8	اللغة، حفظ وتفسير وتحليل سورة الاعلى مع بيان فضل السور ة وسبب تسميتها واهم الاوجه البلاغية والنحوية.
Week 9	الادب، حفظ وتحليل ثمانية ابيات من قصيدة (كن بلسما) للشاعر (ايليا ابي ماضي)مع حياة الشاعر مع اهم الحالات الاعرابية والبلاغية. حفظ وتحليل ثمانية ابيات من قصيدة (ارح ركابك)للشاعر محمد مهدي الجواهري.
Week 10	قواعد اللغة العربية، شرح موضوع (اسماء الاشارة) مع الأمثلة وحالات الاعراب، شرح موضوع (المعرف بالإضافة) مع الأمثلة وحالات الاعراب.
Week	قواعد اللغة العربية، شرح موضوع (الحال)معرفة الحال وصاحبها وما هي انواع الحال مع الأمثلة وحالات الاعراب. الأملاء في اللغة العربية، علامات الترقيم واهميتها في اللغة العربية.

11	
Week 12	**قواعد اللغة العربية، شرح موضوع (العدد)معرفة تميز العدد وماهي اقسام العدد مع الأمثلة وحالات الاعراب.**
Week 13	**الأملاء في اللغة العربية، احكام الهمزة(حمزة الوصل، حمزة القطع، كتابة الهمزة في وسط الكلمة).**
Week 14	**قواعد اللغة العربية، شرح موضوع (كان واخواتها) مع الامثلة وحالات الإعراب.** **الأملاء في اللغة العربية: احكام كتابة الضاد والظاء**
Week 15	**قواعد اللغة العربية، شرح موضوع (إن واخواتها) مع الامثلة وحالات الإعراب.** **الأملاء في اللغة العربية: احكام كتابة التاء المربوطة والمفتوحة والالف الممدودة والمقصورة.**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**5. القرآن الكريم.** **6. كتاب البلاغة والتطبيق.** **7. كتاب الأملاء الواضح .** **8. منهاج اللغة العربية لغير الاختصاص.**	Yes
Recommended Texts	**5. كتاب شرح ابن عقيل على الفية ابن مالك/ ابن عقيل عبد الله بن عبد الرحمن.** **6. كتاب الميسر في اللغة العربية لغير الاختصاص/ الدكتور زياد طارق شولي** **7. كتاب الأملاء الواضح/ للدكتور عباس حسن.** **8. منهاج اللغة العربية العامة لغير الاختصاص/ عبد القادر حسن امين**	Yes
Websites	**4- مكتبة المصطفى http://www.al-mostafa.com/index.htm** **5- مكتبة مشكاة الإسلام http://www.almeshkat.net/books/index.php** **6- الجمعية العلمية للغة العربية http://www.imamu.edu.sa/arabiyah** **منتديات الكتب المصورة http://pdfbooks.net/vb/login.php**	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 -	Sound work with notable errors

			79	
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Biochemistry2			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	BIOT-1419				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGx11 2	**Semester of Delivery**		4
Administering Department		Biotechnology	**College**	College of Science	
Module Leader	Ibtihal Sabri		**e-mail**	dr.ebtehal@uodiyala.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module	Name (if available)		**e-mai**	E-mail	

Tutor		**l**	
Peer Reviewer Name		**e-mai l**	
Scientific Committee Approval Date	01/06/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Biochemistry1	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Aims of biochemistry to study biomolecules and their components such as enzymes, proteins, hormones, antibiotics, and organic acids, and to identify their importance and role in the bodies of living organisms and to exploit them in diagnosing and treating diseases and abnormalities that afflict livingthings 2- Acquisition of practical, scientific, and laboratory information about the basics of biochemistry, which plays a very large role in the medical and pharmaceutical sectors and in many very important jobs. These fields or specializations include the industrial, health, academic, and many other fields. 3- Identify chemical compounds and understand the biochemical reactions that take place in the human body. 4- Understanding of the chemical properties of biomolecules and the ability to use and combine biochemical techniques with genetics and physical biology techniques as well as molecular biology. 5- The ability to diagnosis of diseases through blood indicators and give the ability to understand normal and pathological phenomena in the human body through theoretical and practical lessons. 6- Conducting advanced research in the fields of basic and clinical biochemistry that Serve the community.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Identify the principles of bioenergetics and enzyme catalysis and understand the behavior of enzymes, by describing the catalytic properties and ways to regulate these properties. 2- Understanding the chemical reactions catalyzed by enzymes that

	contribute to all biochemical processes within an organism. 3- Carbohydrates - glucose provides energy for the brain and ½ of energy for muscles and tissues, glycogen is stored glucose, glucose is immediate energy, glycogen is reserve energy 4- Carbohydrates also help to digest protein and fat. 5- Carbohydrates also play a vital part of the metabolism and oxidation of protein, Carbs help feed the brain and nervous system and helps keep the body lean. 6- Define the major pathways of intermediary metabolism of biomolecules, and discuss their bioenergetics, physiological adaptation, metabolic and main hormonal regulation. 7- Understanding major catabolic and anabolic pathways in metabolism of carbohydrates and lipids 8- Explain the key regulatory points in metabolic pathways and understanding hormonal signaling in metabolic pathways. 9- Explain molecular mechanisms underlying major inherited diseases of metabolism.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following. Enzymes, Mechanism of enzymes action, Factors Affecting the Velocity of Enzyme Reaction, Enzyme kinetics, Enzyme inhibition. Metabolism, Carbohydrates metabolism, glycolysis, Citric acid cycle. Gluconeogenesis, Glycogen metabolism – Glycogenesis and Glycogenolysis. Lipid metabolism, Fatty acid oxidation, regulation of beta oxidation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Biochemistry teaching strategy for biotechnology specialty students, conducted through an improved lecture format with a brief content and multimedia courseware. This is done By using the brainstorming method, , and using the discussion method to stimulate thinking and participation of students and to provide an opportunity for questions and discussion, while respecting their opinions and suggestions, and this method helps in developing the student's personality cognitively, emotionally and skillfully. Also using the methods of thinking maps, it is an effective teaching strategy in representing knowledge through schematic forms that link concepts to each other. Concept maps are used to present new information, discover relationships between concepts, deepen understanding, summarize information, and evaluate the lesson. Encouraging students to prepare reports and present seminars with conducting tests to assess students' understanding and levels.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 5
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 9 and 10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Enzymes –Definition –Cofactors -Location of enzyme - How Enzymes work
Week 2	Mechanism of enzymes action -Enzymes classification
Week 3	Specificity of enzyme action - Factors Affecting the Velocity of Enzyme Reaction
Week 4	Enzyme kinetics - Enzyme inhibition - Allosteric enzyme-Isozymes
Week 5	Metabolism - Definition-Carbohydrates metabolism - Digestion of carbohydrate

Week 6	Glycolysis - Reaction of glycolysis - Regulation of glycolysis
Week 7	Midterm Exam
Week 8	Citric acid cycle - Reaction and significance of TCA- Regulation of TCA
Week 9	Gluconeogenesis- Definition-Location-Characteristic- Reaction of gluconeogenesis- Regulation and significance
Week 10	Glycogen metabolism – Glycogenesis – Definition-Location-Characteristic - Reaction of glycogenesis
Week 11	Glycogenolysis - Definition-Location-Characteristic - Reaction of glycogenolysis
Week 12	Regulation of glycogenesis and glycogenolysis
Week 13	Lipid metabolism - Digestion of lipid -Fatty acid oxidation .
Week 14	Reaction and regulation of beta oxidation .
Week 15	**Preparatory week**
Week 16	**final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Blood-Types and serum, plasma
Week 2	Lab 2: General urine examination
Week 3	Lab 3: Blood glucose
Week 4	Lab 4: lipid profile , Cholesterol , Triglycerides
Week 5	Lab 5: Uric acid
Week 6	Lab 6: Urea , Creatinine
Week 7	Lab 7: Total protein
Week 8	Lab 8 Liver enzymes

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to general organic and biochemistry University of Illinois, Urbana-Champaign	Yes
Recommended Texts	Lippincott's Illustrated Reviews: Biochemistry ESSENTIALS OF BIOCHEMISTRY Pankaja Naik PhD ,Professor and Head Department of Biochemistry, MVPS Dr Vasantrao Pawar Medical College Nashik, Maharashtra , India	No
Websites	http://www.schoolarabia.net/kemya/kymia_hyatia/main.htm	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Histology and Microtechnique	**Module Delivery**	
Module Type	Core	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical √ Seminar	
Module Code	BIOT-1420		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGx11 2	**Semester of Delivery**	4
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Massar Hadi	**e-mail**	Masarhadi@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor			
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Microtechnique, cytology	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims	1. The course trains students in the skills of taking samples, making animal histological specimens, and proficiently using microscopes and other laboratory machines.

أهداف المادة الدراسية	2. To provide knowledge of the preparation of tissues for light and fluorescence microscopy 3. To provide knowledge of the histological structure of tissues and organs at both the light and electron microscopic level. 4. To provide a good grounding in histological/histopathological techniques. 5. To the knowledge of laboratory management principles, quality management, and safety procedures in the histology laboratory.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Receive, prepare, and process specimens for histopathological investigation. To include dissection, tissue selection cutting, fixation, and staining, as appropriate. 2. Select the appropriate demonstration technique in the investigation of representative histopathology specimens. 3. Use microscopic examination techniques to investigate histopathological specimens. 4. Recognize normal cellular morphology of representative tissues and organs and common pathobiological processes associated with them. 5. Comply with quality assurance processes associated with histopathological investigations. 6. Describe the receipt, preparation, and processing of specimens for histopathological diagnosis. 7. Describe the appropriate demonstration technique as part of the diagnostic process. 8. Explain and evaluate microscopical examination techniques.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following. ● Compound Microscope ● Non –sectioning methods ● Paraffin methods ● Dissection ● Epithelial tissues ● Connective tissues ● Cartilage ● Bone ● Nervous tissue ● Muscular tissue

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 the following: - Providing students with the basics and additional topics related to the pre-skills education outcomes to solve scientific problems - Students' participation during the lecture to solve some scientific issues - Summer training

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
As		**Time /Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Definition & laboratory rules history, microscopy, types of microscopes, microscope technique, None sectioning methods for samples preparation
Week 2	Sectioning methods (Paraffin) Fixation, washing, dehydration, clearing, Embedding, , advantages and disadvantages

Week 3	Sectioning, microtomes, types of microtomes, frozen sections, mounting, Staining, classification of stains, labeling, Immunological staining
Week 4	Introduction in histology, Components of tissues, basic types of tissues, Epithelial tissue, classification, types
Week 5	Epithelial cell polarity, Specialization of the apical cell surface, Glandular epithelium, classification. Glands classification
Week 6	Connective tissues, components, proper conn. Tissue, Specialize connective tissues, adipose tissue, Cartilage
Week 7	**MID EXAM**
Week 8	Specialize in connective tissues, Cartilage,
Week 9	Bone, Process of Bone Formation
Week 10	Histology of the skin, cells, layers,
Week 11	Muscular system (structure. Arteries and veins sections
Week 12	Nervous system , component, neuron, supporting cells
Week 13	Digestive tract, Sections
Week 14	Liver, spleen, Pancreas,
Week 15	Urinary system, kidney

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Lab 1:	**Material Covered**
Week 1	Lab1: Compound Microscope- Inverted microscope, Fluorescence microscopy, Wet mounts slide
Week 2	Lab 2: The different methods in microscopic slide preparation- Dry Mount, Wet Mount, Squash Slides, Staining, Blood smear: Types of stains: Some blood abnormalities distinguished by a blood smear: Preparation of Peripheral Blood Smear: Leishman's Stain:
Week 3	Lab 3**:** Paraffin methods, killing process, Gross Examination, Fixation, Type of fixative solutions, Dehydration, Paraffin Embedding, Blocking, Sectioning, Staining, Mounting
Week 4	Lab 4-: Mouse Dissection
Week 5	Exam

Week 6	Lab 5: Epithelial tissues
Week 7	Lab 6: Glands
Week 8	Lab 7: Connective tissues: Part 1
Week 9	Lab 8: Connective tissues: Part 2
Week 10	Lab 9: Cartilage
Week 11	Lab 10: Bone
Week 12	Lab 11: Liver, spleen
Week 13	Lab 12: Pancreas, Kidney
Week 14	Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	التحضيرات المجهرية / كواكب المختار Microtechnique /Gray /1977, A text and atlas / Ross and Pawlina /2006 المجلات العلمية الرصينة محاضرات الهيئة التدرسية	Yes
Recommended Texts	Junqueira's Basic Histology Text & Atlas (14th ed.) Anthony L Mescher ..2016	No
Websites	Histology guide http://www.histologyguide.com/about-us/atlas-of-human-histology.html An Atlas of Histology https://www.springer.com/gp/book/9780387949543	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition

Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Biosafety**		**Module Delivery**	
Module Type	**Support**		☒ **Theory** ☒ **Lecture** ☐Lab ☐ Tutorial ☐ Practical ☒ **Seminar**	
Module Code	**BIOT-1421**			
ECTS Credits	**5**			
SWL (hr/Sem)	**125**			
Module Level	UGx11 2	**Semester of Delivery**	4	
Administering Department	Biotechnology	**College**	College of Science	
Module Leader	Shaymaa Hatem Al-Maimaie	**e-mail**	shaymaa@uodiyala.edu.iq	

Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2025	**Version Number**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Prepare students to acquire knowledge and understanding of the conceptual framework and applications of biotechnology and nanotechnology. 2. Prepare students to acquire knowledge and understanding of industrial, environmental, and food microbiology. 3. Prepare students to acquire knowledge and understanding of genetics, genetic engineering, and cellular genetics. 4. Prepare students to acquire knowledge and understanding of plant, plant tissue, and animal biology. 5. Prepare students to acquire knowledge and understanding of diseases, immunity, and pathogenic bacteria. 6. Prepare students to acquire knowledge and understanding of cell biology and microbiology standards. 7. Prepare students to acquire knowledge and understanding of biological statistics and the English language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the principles and importance of biosafety and biosecurity in handling microorganisms and biological materials. 2. Demonstrate knowledge of the different containment levels and appropriate safety measures for working with various biological agents. 3. Apply proper techniques and protocols for handling, storing, and disposing of biological materials to minimize risks and prevent accidental release. 4. Identify potential hazards and assess risks associated with specific biological experiments or procedures. 5. Implement effective measures to mitigate risks and ensure the safety of researchers, the environment, and the community. 6. Comply with relevant regulations, guidelines, and ethical considerations in the field of biosafety and biosecurity.

	7. Recognize the significance of early detection and diagnosis of genetic diseases through genetic engineering and immunological techniques. 8. Understand the principles and applications of tissue culture in the field of animal cell biology. 9. Evaluate and implement appropriate measures to maintain the security and integrity of biological materials and prevent unauthorized access or misuse. 10. Communicate and collaborate effectively within a biosafety framework, demonstrating an understanding of the importance of clear communication and teamwork in maintaining a safe and secure laboratory environment
Indicative Contents المحتويات الإرشادية	1. Introduction to biosafety and biosecurity: Concepts, importance, and historical background. 2. Biosafety levels and containment systems: Overview of different biosafety levels and their associated safety measures and equipment. 3. Risk assessment and management: Techniques for identifying, assessing, and mitigating risks in biological research and laboratory settings. 4. Safe handling and manipulation of biological materials: Proper techniques for handling, storing, and transporting microorganisms, genetically modified organisms (GMOs), and other biological agents. 5. Personal protective equipment (PPE) and laboratory safety protocols: Understanding and implementing appropriate PPE and following established safety protocols. 6. Biohazardous waste management: Proper disposal methods for biohazardous materials and adherence to waste management regulations. 7. Laboratory design and engineering controls: Considerations for designing and equipping a biosafety laboratory, including ventilation systems, containment facilities, and access controls. 8. Security measures and biosecurity protocols: Ensuring the protection and security of biological materials, including strategies for preventing unauthorized access and potential misuse. 9. Genetic engineering and molecular diagnostics: Applications of genetic engineering techniques and molecular diagnostics in the early detection and diagnosis of genetic diseases. 10. Tissue culture techniques: Principles and applications of tissue culture in the context of animal cell biology and biotechnology. 11. Regulatory frameworks and ethical considerations: Understanding and complying with relevant regulations, guidelines, and ethical principles in biosafety and biosecurity practices. 12. Communication and teamwork in biosafety: Effective communication, collaboration, and teamwork within a biosafety framework, including reporting incidents and sharing information.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Demonstration and Practice: Provide hands-on demonstrations and

	practice opportunities for students to learn and apply biosafety and biosecurity techniques. Case Studies: Use real-life examples and scenarios to help students understand the practical application of biosafety and biosecurity measures. Visual Aids and Multimedia: Utilize visual aids and multimedia resources to enhance understanding of biosafety and biosecurity concepts.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to biosafety
Week 2	Introduction to biosecurity
Week 3	Chemical hazardous part 1
Week 4	Chemical hazardous part 2
Week 5	Exam
Week 6	Radiation hazardous
Week 7	Waste management p1
Week 8	Waste management p2
Week 9	Shipping of hazard materials p1
Week 10	Shipping of hazard materialsp2
Week 11	BIOSECURITY
Week 12	BIOSECURTY -2
Week 13	Dual Use Research of Concern (DURC)
Week 14	Dual Use Research of Concern (DURC) 2
Week 15	Exam
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Biological Safety: Principles and Practices, 5th Edition Dawn P. Wooley (Editor),	Yes
Recommended Texts	Biological Safety: Principles and Practices, 5th Edition Dawn P. Wooley (Editor), Karen B. Byers	No
Websites		

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX - Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F - Fail	راسب	(0-44)	Considerable amount of work required

Note:
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Semester Five

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Molecular Biology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1UGIII		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Alyaa Maan Abdalhameed		e-mail	Alyaa.maen@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
	Dalal Salah		**e-mail**		
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	7. To study the molecular basis of biological activity. 8. Deals with the basic concept of molecular biology 9. Deals with the examination of plants, animals, as well as human genetics in order to find the variation as well as relationships between them. 10. The field of molecular biology is focused especially on nucleic acids (e.g., DNA and RNA) and proteins—macromolecules that are essential for life processes. 11. Studying the behavior of cells in various conditions and their functional structure. 12. Studying the chemical structures and processes of biological phenomena that involve the basic units of life, molecules. 13. Given the fundamental importance of these macromolecular mechanisms throughout the history of molecular biology. 14. To develop knowledge skills and understanding of Molecular Biology theory through some application techniques 15. The field overlaps with other areas of biology and chemistry, particularly genetics and biochemistry
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	9. To understanding the interactions between the various systems of a cell, including the interactions between DNA, RNA and protein biosynthesis, the transcription factors as well as learning how these interactions are regulated. 10. Understanding the complex molecular networks of a single molecule to inspect the activities of a cell during life processes. 11. To understand macromolecules and the macromolecular mechanisms found in living things, such as the molecular nature of the gene and its mechanisms of gene replication, mutation, expression . 12. Identify the relationship between prokaryotic and eukaryotic cells depending on a molecular level. 13. Particular, molecular biology seeks to understand the three-dimensional structure of biological macromolecules through several techniques 14. Learning how these molecules (nucleic acid and proteins)interact and behave within the cells to promote proper growth, division, and development . 15. Learning the ability to extract and purify DNA and RNA from animal, Plant, and bacterial cells, measure DNA purity and concentration and conduct genetic tests. 16. Become familiar with gel electrophoresis (method for DNA separation and analysis). 17. They conduct experiments involving the molecular genetics of cells to research and prepare a report of their findings. 18. List the various terms associated with molecular biology. 19. Analyzing genetically the functioning and mechanism of cells.

	20. Identify the basic of molecular biology and their applications.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	**The indicative content of Molecular biology includes the following.** **Lec1:** A-Introduction of molecular biology B-Definition of Molecular biology C-Identified DNA as the primary agent of genetic material D-key experiments which identified DNA as the primary genetic material E-The two major piece of evidence supporting DNA as the genetics material [15 hrs] **Lec 2:** A-The chemical composition of nucleic acid B-The structure of DNA and RNA. C-What is the structure of DNA? How is the structure related function? D-Chargaff's Law : the experiment , examples of Chargaff's Law applications . E-The history of DNA structure. **Lec 3:** A-The Watson and Crick model. B-Watson and Crick Physical characteristics of the model C-Base Pairs and Stacking D-Alternative DNA Structures E-Compare between prokaryotic and eukaryotic cells F-DNA and RNA Molecules in different types of cells **Lec 4:** A-Different types of nucleic acid B Supercoiling is Necessary for Packaging of Bacterial DNA C-The Eukaryotic Nucleosome. D-Some examples of genome in different organisms. **Lec 5:** A-Melting Separates DNA Strands ; Cooling Anneals Them B- Hybridization of DNA and RNA C- Fluorescence in Situ Hybridization (FISH) D- Types of DNA sequencing . **Lec 6:** A-DNA Replication Introduction to Prokaryotic replication B-Mechanism of DNA replication C-Stages of replication process(initiation ,elongation and termination) D-Types of enzymes in stages of replication **Lec 7**: Eukaryotic Chromosomes B-Synthesis of Eukaryotic DNA C-Types of enzymes in stages of replication D- Stages of replication process E-Cell Division in Higher Organisms. **Lec 8:** A-Overview of Recombination B-Types of Recombination C- Recombination in Higher Organisms

	D-Types of repair system **Lec 9**: introduction to gene expression A-Types of RNA B-The structure of RNAs C- Structure and function of Ribosomal RNA: D- Structure and function of Transfer RNA: **Lec 10:** A-Transcription process in prokaryotic and eukaryotic cells B-Stages of transcription C-Enzymes in transcription stages **Lec 11:** The modification and splicing of pre –mature RNA in eukaryotic cells: A-The Structure of Messenger RNA B-Modification methods: 1-Add cap in 5UTR 2-Add poly A in 3UTR C- The process of splicing D- The Comparison between prokaryotic and eukaryotic cells in transcription **Lec 12:**A- Regulation at the Level of Transcription Involves Several Steps . B-Types of genes . B- The Operon Model of Gene Regulation C-Examples of operons **Lec 13**: A-Genetic code B-Characterization of Genetic code C- wobble hypothesis **Lec 14:** A-Types of proteins B- The types of amino acids C-Classification of amino acids according to function and structure **Lec 15:** A-Translation process in prokaryotic and eukaryotic cells B-Stages of translation . C-Enzymes in translation stages D-compare between prokaryotes and eukaryotic cells.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, scientific visits, and by considering types of simple experiments involving interesting sampling activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعاتملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	71	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	79	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 3, and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8,9 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	History of molecular biology
Week 2	Genes, Genomes and DNA The chemical composition of nucleic acid
Week 3	The Watson and Crick model of DNA
Week 4	The structure of DNA in the Cell (prokaryotes and eukaryptes cells)
Week 5	Reversible denaturing of DNA (denaturation and hybridization) Types of DNA sequences in the cell
Week 6	Cell Division and DNA Replication (Replication in Prokaryotic cells)
Week 7	DNA Replication in Eukaryotic cells
Week 8	Recombination and Repair
Week 9	Mid-term Exam + Introduction to Gene Expression
Week 10	Transcription of Genes (Transcription in eukaryotes and Prokaryotes cells)
Week 11	The modification and splicing of pre–mature mRNA in eukaryotic cells (The Structure of Messenger RNA)
Week 12	Regulation of gene expression.
Week 13	Genetic Code (Characteristics of the Genetic Code)
Week 14	Protein Structure and Function
Week 15	The Translation process (Protein Synthesis)
Week 16	The preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab 1:** Laboratory tools and apparatus (Get introduced to the essential tools and apparatus)
Week 2	**Lab 2:** preparation of laboratory solutions (concentration and Dilutions) (Get introduced to the different important chemicals and their preparation)

Week 3	**Lab 3:** Molarity calculation Relating to DNA and RNA (Knowing how to calculate the molarity o nucleic acid)
Week 4	**Lab 4:** Laboratory solutions for nucleic acid extraction and maintaining (Get introduced to the main solutions used to keep nucleic acid in an intact state)
Week 5	**Lab 5:** DNA extraction from human blood (Solution and bacterial preparation for extraction and learn how to do the isolation.)
Week 6	**Lab 6:** DNA extraction from Bacteria (Solution and blood sample preparation for extraction and following the experiment steps and learn how to perform the isolation)
Week 7	**Lab 7:** DNA extraction from plant (Solution and plant sample preparation and following the experiment steps and learn how to perform the isolation)
Week 8	**Lab 8:** RNA isolation (Get introduce to extraction solutions and steps)
Week 9	**Lab 9** : Determining DNA concentration and purity (Learn how to measure and to determine the purity and concentration of extracted nucleic acid)
Week 10	**Lab 10:**AgaroseGel Electrophoresis of DNA (Get introduced to the main concept of this technique and learn how to perform it)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Molacular Biology. David Clark.(2005) (printed in Elsevier Academic Press).	Yes
Recommended Texts	Genetics / Benjamin, A .pierce . (2002). MOLECULAR BIOLOGY, Anjali Priyadarshini and Prerna Pandey,(2018).	No
Websites	https://www.infobooks.org/free-pdf-books/biology/molecular-biology https://youtu.be/3jslVQDGkLU, https://youtu.be/8wAwLwJAGHs	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Mar**	**Definition**

			ks (%)	
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Plant Biotechnology**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**BIOT35020**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	11 UGIII		**Semester of Delivery**	5
Administering Department	Type Dept. Code		**College**	Type College Code

Module Leader			
Module Leader's Acad. Title	Assist .Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Alhan Mohammed Alwan		Email: alhanalwan@uodiyala.edu.iq
Peer Reviewer Name			
Scientific Committee Approval Date	6/8/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادي	
Module Aims أهداف المادة الدراسية	16. This course deals with the study of plant biotechnology . 17. To understand the role of plants in medical and industrial purposes. 18. Role of plant extraction in molecular biology ,genetics and environmental.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	21. To understand plant biotechnology, Some important terms in medical and industrial purposes. 22. To know the types of plant secondary compounds. 3. Advance plant breeding and plant improvement by learning critical skills in molecular biology, genetics, environmental 4. Plant biotechnology is a part of our daily lives in applications such as developing nutritionally enhanced foods, enabling sustainable agricultural production, and engineering plants for industrial and medical purposes. 5. The Plant Biotechnology major provides an inter disciplinary curriculum integrating the science and practice of crop production through courses in molecular biology, genetics, biochemistry, plant protection, 6. Understand the Role of plant biotechnology to develop sustainable

	environmental practices that reduce pollution and waste. 7. Understand the Role of plant biotechnology to develop antibiotic and pesticides
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the collection of different of plants. Isolation and primitive identification according to the acquired skills from the theoretical and practical information through lectures and Lab.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	71	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	79	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 3, 5 , 8 and 12
	Assignments	2	10% (10)	2, 12	LO # 2, 4, 6 and 9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 3, 5, 6 and 9
Summative	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-7

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	History and scope of plant biotechnology. Introduction, definitions, cell theory, concept of in vitro cell culture
Week 2	**Scope and importance of biotechnology ,pharmaceutical sciences ,industrial biotechnology ,environment ,agriculture ,educational scope**
Week 3	Classical and Neoclassical Techniques for secondary metabolite production in plant cell culture, introduction
Week 4	Conventional methods ,plant cell culture, **Organic cultures for secondary metabolite production**
Week 5	**Conventional methods, strain improvement ,media optimization,suger level ,Nitrate level , phosphate levels ,growth regulators**
Week 6	**Culture conditions,Temperatur,IIIumination,Medium PH**
Week 7	Mid-term Exam.
Week 8	**Secondary metabolites of plant , classification: (Terpenoids),** definitions, General function, types, structure
Week 9	**Nitrogen containing compound (**Alkaloids**)**, definitions, General function, types, structure
Week 10	**Secondary metabolites of plant , classification: (Phenolics),** definitions, General function, types, structure
Week 11	**Secondary metabolites of plant , classification: (Tannins),** definitions, General function, types, structure
Week 12	**Secondary metabolites of plant (Glycosides)** , definitions, General function, types, structure
Week 13	**Extraction of glycosides from plants.**
Week 14	**Production of secondary metabolites in culture.**
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Significance of medicinal plants to human being
Week 2	Extraction techniques of medicinal plants
Week 3	Plant Secondary Metabolites (Terpenoids)
Week 4	Some of Plant Secondary Metabolites (Essential Oils)
Week 5	Plant Secondary Metabolites (Alkaloids)
Week 6	Plant Secondary Metabolites (Drug application of Alkaloids)
Week 7	Plant Secondary Metabolites Phenolic compounds(phenols)
Week 8	Plant Secondary Metabolites (Tannins)
Week 9	Mid-term Exam.
Week 10	Plant Secondary Metabolites (Flavonoids)
Week 11	Some of Plant Secondary Metabolites (Glycoside)
Week 12	Separation and isolation techniques.
Week 13	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Plant biotechnology , K.G. Ramawat 2008** PLANT BIOTECHNOLOGY AND TRANSBENIC PLANTS By: KIRSI-MARJA OKSMAH-CALDENTEY and WOLFGANG H. BARZ/ 2002	Yes
Recommended Texts	Plant Biotechnology: Recent Advancements and Developments By:Suresh Kumar Gahlawat • Raj Kumar and Salar Priyanka Siwach/ 2007	Yes
Websites	PRINCIPLES OF PLANT BIOTECHNOLOGY ICAR eCourse / 2015	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Gene-Chemo biotechnology	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	BIOT35021		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	11 UGIII	**Semester of Delivery**	5
Administering Department	Biotechnology	**College**	Science

Module Leader			
Module Leader's Acad. Title	Professor/ Professor	**Module Leader's Qualification**	Ph.D./ Ph.D.
Module Tutor	م. د اثمار عدنان حكمان		اليميل : athmaradnan@uodiyala.edu.iq
Peer Reviewer Name			
Scientific Committee Approval Date	6/8/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	● This course includes covering the concepts of biochemical and genetic techniques. It aims to deal with microorganisms, plant and animal cells in the medical and industrial fields, and their components of vital compounds, by applying all modern technologies. ● In the investigation of DNA and methods of extraction and purification and detection of damage resulting in addition to the control of gene expression. ● In the investigation of proteins and methods of extraction, as well as methods of purification and determination of molecular weight.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Extraction, precipitation of Protein. 2. Protein purification. 3. Calculations and Preparing a Purification Table. 4. Column chromatography. 5. Estimation of molecular weight by gel filtration. 6. Structure and Function of DNA. Control the cloned gene expression under transcription and translation. 7. The Nucleic acid purification. 8. Understand the quantification method for detect the DNA damage (by: Comet assay technique). 9. Technique for Quantitative detection of specific DNA sequences.

	10. Understand the process of transformation techniques.
Indicative Contents الإرشادية المحتويات المفتاحية الكلمات يتضمن للمحاضرات المهمة	Indicative content includes the following. **Part A –** - **Introduction of Protein purification**: define of Protein purification, method of Extraction protein [5. hrs] - **Precipitation and differential solubilization:** Ammonium sulfate precipitation by (NH4)2SO4, salting out, salting in,Dialysis, method of Removing the ammonium sulphate , Ultracentrifugation, Purification table - **Column chromatography:** define; Common types of chromatographic stationary phases, Ion exchange resins contain charged groups. [11 hrs] - **Gel filtration chromatography:** Types of gels used ; Dextran:, Polyacrylamide, Agarose, Advantages of Gel filtration, Applications of gel filtration[8. hrs] - **Estimation of molecular weight by gel filtration:** Elution volume (Ve) Relative elution volume (Ve/V0), Void volume, Vo. [6 hrs] - **Application of Estimation of molecular weight of unknown protein[12. hrs]** - **Application of precipitation table[5 hrs]** **Part B - Gene-chemobiotechnology of Protein techniques.** …… **Gene-chemobiotechnology of DNA techniques.** **-Structure & Function of DNA** – Nucleoside, Ncleotide, Reversible Denaturing of DNA, Melting temperature (Tm) [5 hrs] **-Gene Technology** – Optimization of cloned genes expression, Promoters, *lac* Promoters, *Trp* Promoters, (б) factor, expression vectors, Shine-Dalgarno(S-D) sequence, Coding usage, Short tandem repeats (STRs), simple sequence repeats (SSRs), *E. coli*. [11 hrs] **-The Nucleic acid purification** – DNA purification, EtBr-CsCl gradient, Solid-phase, Nucleic Acid Extraction , cell lysis, oligo(dT), affinity chromatography, Isolate mRNA. [8 hrs] **-Comet assay technique** – single-cell gel electrophoresis, (SCGE), fluorescent dye, epifluorescence microscopy, genotoxicity testing , mechanistic studies of DNA damage and repair. [6 hrs] **-Nucleic Acids Detection Techniques**- genetically modified organisms, (GMO), Quantitative detaction of specific DNA sequences, Southern blotting, Northern blotting, Identify inherited disease, electrophoretic, nitrocellulose paper support, radioactive probe, formaldehyde, Capillary blotting, hybridization . [12 hrs]

	-**Polymerase chain reaction& Microarray technique** – Denaturation, Primer Annealing, Extension, Taq polymerase, DNA amplification, Polymorphisms, parallel gene expression analysis, Manufacturing of microarrays, cDNA, DNA GeneChip, Affymetrix, Allele. [12 hrs] **-DNA Exchanged –** transformation, naturally transformable bacteria, competent cells, heat shock, Electroporation. [5 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessm	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignment	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

ent	**s**				
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	15	LO # 1-14
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	-Introduction of Protein purification
Week 2	-Precipitation and differential solubilization
Week 3	- Introduction of Column chromatography
Week 4	- Ion exchange chromatography
Week 5	- Gel filtration chromatography
Week 6	- Estimation of molecular weight by gel filtration:
Week 7	- Application of Estimation of molecular weight of unknown protein
Week 8	DNA Exchanged
Week 9	Structure & Function of DNA
Week 10	Gene Technology
Week 11	The Nucleic acid purification
Week 12	Comet assay technique
Week 13	Nucleic Acids Detection Techniques
Week 14	Polymerase chain reaction& Microarray technique
Week 15	**The Midterm Exam**

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Extraction methods of protein
Week 2	Lab 2: Precipitation of Protein
Week 3	Lab 3: Ion Exchange Chromatography
Week 4	Lab 4: Gel filtration Chromatography
Week 5	Lab 5: DNA Structure
Week 6	Lab 6: DNA and Protein sequence online databases
Week 7	Lab 7: Plasmid DNA Isolation
Week 8	Lab 8: Polymerase Chain Reaction
Week 9	Lab 9: Application of primer design
Week 10	Lab 10: Application NCBI

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Wilson and walkers principles and techniques of biochemistry and molecular biology,8th,2018	Yes
Recommended Texts		No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A** - Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	**B** - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Pathogenic Bacteria**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	BIOT35022				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	11UGIII		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zainab Amer Hatem |			Email: Zainabamer@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**		
Module	Hiba Ali Hilal Ahmed |		**e-**	Email: Hiba.a@uodiyala.edu.iq	

Tutor		**mail**	
Peer Reviewer Name			
Scientific Committee Approval Date	6/8/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	19. To develop knowledge skills and understanding of Bacteriology theory through some application techniques. 20. To develop a comprehensive understanding of the fundamental principles and concepts of bacteriology, including the structure, and classification of bacteria. 21. To explore bacteria's diverse roles and impact in various fields, such as medicine. 22. To examine the pathogenicity of bacteria and their interactions with host organisms, including the mechanisms of infection, virulence factors, and host immune responses. 23. To introduce diagnostic techniques used in bacteriology, including microscopy, culture methods, biochemical tests, and molecular diagnostics for identifying and characterizing bacteria. 24. To explore the diversity of bacteria in different environments, their ecological roles, and their adaptations to extreme conditions. 25. To develop critical thinking and analytical skills in evaluating scientific literature, experimental data, and research findings related to bacteriology.

	26. To promote effective communication and collaboration in discussing and presenting bacteriological concepts, research, and practical applications. 27. To instill an awareness of ethical considerations and biosafety practices in bacteriological research and applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	23. Knowledge of Bacterial Classification: Understand the classification and taxonomy of bacteria, including major bacterial groups, their characteristics, and distinguishing features. 24. Understanding Bacterial Morphology: Identify and describe the different morphological forms of bacteria, such as cocci, bacilli, spirilla, and their variations. 25. Understanding Bacterial Pathogenesis: Gain insight into the mechanisms by which bacteria cause disease, including virulence factors, host-pathogen interactions, immune response to bacterial infections, and strategies for bacterial control. 26. Understanding Diagnostic Techniques: Familiarize students with laboratory techniques used for the identification and diagnosis of bacterial infections, including staining methods, culture techniques, biochemical tests, and molecular diagnostics. 27. Understanding Bacterial Interactions: Gain knowledge of bacterial interactions with other microorganisms, such as symbiotic relationships, biofilm formation, and competition within microbial communities. 28. Application of Bacteriology: Apply the acquired knowledge of bacteriology in practical contexts, such as clinical microbiology, environmental microbiology, food microbiology, industrial applications, and research endeavors
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	The indicative content of bacteriology includes the following. **Lec1: Introduction to pathogenic Bacteria:** Definition and scope of bacteriology Historical milestones and contributions to the field **Lec 2: Bacterial Pathogenesis and Host Interactions: Mechanisms of bacterial pathogenicity, Virulence factors: adhesion, invasion, toxins, Host response to bacterial infections: innate and adaptive immunity, Principles of bacterial control and prevention** **Lec 3: Normal flora,** definition, types of normal bacteria flora, Understanding the composition and functions of the normal flora is crucial

	for maintaining a healthy microbial ecosystem **Lec 4: Gram-positive bacteria** **-The genus of Staphylococci**; Overview of the Staphylococci genus and its characteristics, Cell Structure, and Morphology, Staphylococcal Infections: Laboratory Diagnosis of Staphylococcal Infections, Treatment, and Prevention of Staphylococcal Infections **Lec 5: Genus of Streptococci**, Overview of the Streptococci genus and its characteristics, Virulence Factors of Streptococci: Streptococcal Infections, Laboratory Diagnosis of Streptococcal Infections, treatment and Prevention of Streptococcal Infections **Lec 6: Gram negative cocci** **Genus of Neisseria,** Neisseria Species, , Neisseria Overview and its characteristics, , Neisseria Toxin Production, Neisseria Disease, , Neisseria Pathogenesis, , Neisseria Diagnosis: , Neisseria Laboratory diagnosis **Lec. 7 : Gram-negative rod:** **-Escherichia coli**, Strains and Types , Escherichia coli Overview and its characteristics, Escherichia coli Toxin Production, Escherichia coli Disease, Escherichia coli Pathogenesis, Diagnosis: Laboratory diagnosis of Escherichia coli - **Genus of Proteus** , Proteus Strains and Types , Proteus Overview and its characteristics, Proteus Toxin Production, Proteus Disease, Proteus Pathogenesis, Diagnosis: Laboratory diagnosis of Proteus **Genus of Klebseilla** , Strains and Types , Klebseilla Overview and its characteristics, Klebseilla Toxin Production, Klebseilla Disease, Klebseilla Pathogenesis, Klebseilla Diagnosis: Laboratory diagnosis of Klebseilla **Lec 8: SALMONELLA and SHIGELLA** , SALMONELLA and SHIGELLA Overview and its characteristics, SALMONELLA and SHIGELLA Toxin Production, SALMONELLA and SHIGELLA Disease, SALMONELLA and SHIGELLA Pathogenesis, SALMONELLA and SHIGELLA Diagnosis: Laboratory diagnosis **Lec. 9 : PSEUDOMONAS**, : PSEUDOMONAS Overview and its characteristics, : PSEUDOMONAS Toxin Production, : PSEUDOMONAS Disease, : PSEUDOMONAS Pathogenesis, Diagnosis: Laboratory diagnosis of : PSEUDOMONAS **Lec. 10: - BACILLUS SPECIES: Spore and non-spore forming bacteria:** **Spore forming bacteria, Genus of CLOSTRIDIA,** Overview and its

	characteristics, BACILLUS species types, BACILLUS Toxin Production, BACILLUS Disease BACILLUS, Pathogenesis, Diagnosis: Laboratory diagnosis of BACILLUSu **Lec.11: -Non-spore forming bacteria, Corynebacterium diphtheriae ,** an overview and Corynebacterium diphtheriae characteristics, Corynebacterium diphtheriae Toxin Production, Diphtheria Disease, Corynebacterium diphtheriae Pathogenesis, Diagnosis: Laboratory diagnosis of diphtheria involves the identification of Corynebacterium diphtheriae in clinical samples. **Lec. 12: Mycobacterium bacteria,** Mycobacterium overview and its characteristics, Mycobacterium Toxin Production, Tuberculosis Diseases, Mycobacterium Pathogenesis, Diagnosis: Laboratory diagnosis of Tuberculosis involves the identification of Mycobacteria tuberculosis, M. leprae in clinical samples. **Lec 13: Genus of Bacteroides** Overview and its characteristics, Bacteroides Toxin Production, Bacteroides Disease, Bacteroides Pathogenesis, Diagnosis: Laboratory diagnosis of Bacteroides . **Lec 14: Genus of Spirochetes ,** Structure and Morphology, Pathogenic Spirochetes, Spirochetes Toxin Production, Spirochetes Disease, Spirochetes Pathogenesis, Diagnosis: Laboratory diagnosis of Spirochetes **Lec 15: Mycoplasmas ,** Structure and Morphology, Pathogenic Mycoplasma, Mycoplasmas Toxin Production, Mycoplasmas Disease, Mycoplasmas Pathogenesis, Diagnosis: Laboratory diagnosis of Mycoplasmas

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, scientific visits, and by considering types of simple experiments involving interesting sampling activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem)	64	**Structured SWL (h/w)**	4.26

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 3, and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8,9 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Bacteriology:
Week 2	Bacterial Pathogenesis and Host Interactions
Week 3	Normal flora
Week 4	Gram positive bacteria- Staphylococci
Week 5	Streptococci
Week 6	Gram negative rod
Week 7	Neisseria

Week 8	Escherichia coli
Week 9	SALMONELLA and SHIGELLA
Week 10	Haemophilus influenzae,
Week 11	PSEUDOMONAS
Week 12	CLOSTRIDIA
Week 13	Bacteroides
Week 14	Spirochetes
Week 15	Mycoplasmas
Week 16	The preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	**Lab 1: Introduction in practical bacteriology**
Week 2	Staphylococci
Week 3	Streptococci
Week 4	Gram negative rod
Week 5	Neisseria
Week 6	Escherichia coli
Week 7	SALMONELLA and SHIGELLA
Week 8	**CLOSTRIDIA**
Week 9	**Bacteroides**
Week 10	**Review and rendering all labs**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lippincott's Illustrated Reviews - Microbiology (Thao Doan, Roger Melvold)	Yes
Recommended Texts		No
Websites	https://www.microbiologybook.org/book/immunol-sta.htm	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Fermentation Technology**	**Module Delivery**
Module Type	**Core**	**☒ Theory** **☒ Lecture**

Module Code	BIOT35023	☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
ECTS Credits	**6**	
SWL (hr/sem)	**150**	

Module Level	**UGIII**	**Semester of Delivery**	**5**
Administering Department	**Type Dept. Code**	**College**	**Type College Code**
Module Leader	Shaymaa Hatem Al-Majmaie |		Email: shaymaa@uodiyala.edu.iq
Module Leader's Acad. Title	**Professor**	**Module Leader's Qualification**	**Ph.D.**
Module Tutor	د اثمار عدنان حكمان .م		اليميل : athmaradnan@uodiyala.edu.iq
Peer Reviewer Name			
Scientific Committee Approval Date	6/8/2025	**Version Number**	**1.0**

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	1. **Introduce the fundamental principles of fermentation: To provide students with a comprehensive understanding of microbial fermentation processes, including aerobic and anaerobic systems.** 2. **Develop practical skills in fermenter design and operation: To equip students with knowledge of bioreactor configurations, scale-up strategies, and process control mechanisms.** 3. **Understand microbial physiology and metabolism in fermentation: To explore how growth kinetics, substrate utilization, and metabolic pathways influence product yield and process efficiency.**

	4. **Analyze upstream and downstream processing: To familiarize students with media formulation, sterilization, inoculum preparation, and product recovery techniques.** 5. **Apply fermentation strategies in industrial biotechnology: To explore the production of antibiotics, enzymes, biofuels, organic acids, and recombinant proteins via microbial fermentation.** 6. **Encourage innovation through case studies and research exposure: To inspire students to connect academic knowledge with real-world biotechnological applications through industry-relevant examples and literature.**
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. **Explain the fundamental principles of fermentation processes** • **Illustrate the stages of microbial growth and their relevance to product formation.** 2. **Analyze microbial metabolism and its impact on fermentation** • **Evaluate factors influencing microbial growth kinetics and substrate utilization.** 3. **Design and evaluate bioreactor systems** • **Compare various bioreactor types and configurations.** • **Calculate and interpret key parameters such as agitation, aeration, oxygen transfer, and pH control.** 4. **Demonstrate knowledge of upstream processing** • **Formulate suitable media for different types of fermentations.** • **Outline inoculum development and sterilization techniques.** 5. **Assess downstream processing strategies** • **Describe the steps involved in product separation and purification.** • **Select appropriate downstream techniques based on product characteristics.** 6. **Interpret and analyze fermentation data** • **Use experimental results to monitor process performance.** • **Apply basic statistical and analytical tools to assess fermentation outcomes.** 7. **Work effectively in laboratory and team settings** • **Operate basic fermentation equipment safely and efficiently.** • **Collaborate in planning, conducting, and reporting on fermentation experiments.**

Indicative Contents **المحتويات الإرشادية** **يتضمن الكلمات المفتاحية المهمة للمحاضرات**	**This course includes coverage of concepts (Fermentation Techniques):** **Aimed at exploiting the microbial cells and their components in the production of many vital compounds such as enzymes, proteins, hormones, antibiotics, organic acids and their use in the industrial and environmental fields. The use of bioreactor in the production of microbial metabolites.**

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**71**	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	**4.26**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**79**	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	**4.06**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**2**	**10% (10)**	**5, 10**	**LO #1,2,,3 and 10**
	Assignments	**2**	**10% (10)**	**2, 12**	**LO # 3,4,5,6 and 7**
	Projects / Lab.	**1**	**10% (10)**	**Continuous**	**All**
	Report	**1**	**10% (10)**	**13**	**LO # 5,8,9 and 10**
Summative assessm	**Midterm Exam**	**2hr**	**10% (10)**	**7**	**LO # 1-7**
	Final Exam	**2hr**	**50% (50)**	**15**	**All**

ent					
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	**Production of ethanol by yeast.**
Week 2	**Isolation of Industrial Microorganisms from Soil and their Potential to Produce Antibiotics.**
Week 3	**The rate of fermentation varies with the type of sugar being metabolized.**
Week 4	**Fermentation of lactose by lactic acid producing bacteria: Yoghurt**
Week 5	**Exam**
Week 6	**How fermentation varies with changes in temperature.**
Week 7	**Yeast fermentation with and without aeration**
Week 8	**Anaerobic fermentation**
Week 9	**Production of protease by *Aspergillus niger* in liquid culture**
Week 10	**Production of protease by *Aspergillus niger* in solid state fermentation**
Week 11	**Bioreactor: design and construction**
Week 12	**How to sterilize bioreactor**
Week 13	**Downstream processing: how to extract and purified a microbial product from fermentation culture.**
Week 14	**Downstream processing: Purification of enzymes from liquid culture**
Week 15	**Downstream processing: Purification of enzymes from solid state fermentation**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	**1. Manual of Industrial Microbiology and Biotechnology, (Third edition 2010) By Richard H. Baltz *et. al*.** **2- Principles of fermentation technology (second edition 2003) By Stanbury PF; Whitaker; Hall SJ.** **3- Bioprocess Engineering: Basic concepts By Fikret Kargi.** ➢	**yes**
Recommended Texts	**1. Fermentation Microbiology and Biotechnology A.L Demain *et. al*** **2. Practical Fermentation Technology Brain Mchneil & Linda M. Harvey.**	**No**
Websites	**WWW.Fermentation technology.org**	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A - Excellent**	امتياز	**90 - 100**	**Outstanding Performance**
	B - Very Good	جيد جدا	**80 - 89**	**Above average with some errors**
	C - Good	جيد	**70 - 79**	**Sound work with notable errors**
	D - Satisfactory	متوسط	**60 - 69**	**Fair but with major shortcomings**
	E - Sufficient	مقبول	**50 - 59**	**Work meets minimum criteria**
Fail Group (0 – 49)	**FX – Fail**	راسب (قيد المعالجة)	**(45-49)**	**More work required but credit awarded**
	F – Fail	راسب	**(0-44)**	**Considerable amount of work required**

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية					
Module Title	**Mycology**			**Module Delivery**	
Module Type	**Cor**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	BIOT35024				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	11 UGIII		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Najwan Kaleil Ibrahim			Email: Najwanabbas@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor					
Peer Reviewer Name					
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	28. This course deals with the basic concept of mycology. 29. To understand the role of mycology in biotechnology field.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	29. To know the old classification systems of fungi. Morphology of fungi, how fungi differ from bacteria, Sexual and asexual spores 30. To know the importance of fungi, Living mode of fungi, Cultivation of fungi, , Reproduction. 31. Recognize the new classification systems of fungi, and the main divisions and characteristics to each divisions and classes, Division: Myxomycota, Classification and the main characteristics of this division with examples 32. Divisions: Eumycota and Classes: Chytridiomycetes and Hyphochytridiomycetes, The main characteristics for each class with examples. 33. Class: Oomyceyes, Main characteristics, Classification to its orders, with examples. 34. Class: Zygomycetes, Main characteristics, Classification to its orders, with examples. 35. Class: Ascomycetes: Main characteristics, Classification to its subclasses, with examples. 36. Class: Deutomycetes: Main characteristics, Classification to its subclasses, with examples. 37. To use these characteristics to isolate, purify, and identify the fungi which obtained from different sources. 38. Recognize how fungal isolates can play very important role in biotechnology such as production of bio materials. 39. To understand that, there is a group of fungi causes diseases like skin infection. 40. To recognize that, there is a group of fungi which has ability to produce types of mycotoxins
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following:- Introduction, Fungal classification systems, How fungi differ from bacteria, Morphology of fungi, Reproduction. Important of fungi, Living mode of fungi, Cultivation of fungi, sexual and asexual reproduction in fungi. Classification of fungi, Division 1: Myxomycota, general characteristics, the classes involved in this division. (One example for each class). Division 2: Eumycota , general characteristics, Class 1,Chytridiomycetes and its classification, Class 2, Hyphochytridiomyctes. Division 2: Eumycota, Class 3: Oomyctes , general characteristics, and the classification of this class. Division 2: Eumycota, Class 4: Zygomycetes, general characteristics, Orders involved in this class. The role of some strains in production of biomaterials. Division 2: Eumycota, Class 5: Ascomycetes, general characteristics, Subclasses involved in this class. The role of some strains in production of biomaterials, food manufacturing, plant pathogens, Human pathogens.

	Division 2: Eumycota, Class 6: Basidimycetes, general chracteristics, Subclasses involved in this class. The role of some strains in production of enzymes such laccase, peroxidase, cellulose, Edible and poising mushroom. Division 2: Eumycota, Class 7: Deutromycetes, general chracteristics, Subclasses involved in this class. Medical mycology Mycotoxins

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the collection of different samples, media preparation. Isolation and primitive identification according to the acquired skills from the theoretical and practical information through lectures and Lab.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summat	**Midterm**	2 hr	10% (10)	7	LO # 1-7

ive assessment	**Exam**				
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction, Classification systems of fungi, Morphology of fungi, Sexual and asexual spores
Week 2	Important of fungi, Living mode, Elements and environmental requirements for fungi cultivation, Sexual and asexual reproduction, sexual compatibility.
Week 3	Classification of fungi, Division 1: Myxomycota, general characteristics, the classes involved in this division. Myxomycetes and Plasmodiophoromycetes (One example for each class).
Week 4	Division 2: Eumycota , general characteristics, Class 1,Chytridiomycetes and its classification, Order1: Chytridiales, order 2: Blastocladiales , order 3: Monoblepharidales. Class 2, Hyphochytridiomyctes.
Week 5	Division 2: Eumycota, Class 3: Oomyctes , general characteristics, and the classification of this class. Order 1: Saprolegniales Order 2: Peronosporales and the families involved in this order: Family 1:- Pythiaceae, Family2:- Peronosporaceae Family 3:- Albuginaceae.
Week 6	Division 2: Eumycota, Class 4: Zygomycetes, general characteristics, Orders involved in this class. Order 1: Mucorales Order 2: Entomophthorales Order 3: Zoopagales . The role of some strains in production of biomaterials.
Week 7	Mid-term Exam.
Week 8	Division 2: Eumycota, Class 5: Ascomycetes, general characteristics, Subclasses involved in this class. Subclass 1: Hemiascomycetidae which classified into Order 1: Endomycetales contains two families. Family 1:- Endomycetaceae and Family 2: Saccharomycetaceae. Order 2: Taphrinales. The role of some strains in production of biomaterials, food manufacturing, plant pathogens, Human pathogens.
Week 9	Division 2: Eumycota, Class 5: Ascomycetes, Subclass 2**:** Euascomycetidae**,** general characteristics**.** Classification of this subclass which involves three Series: Series 1: Plectomycetes Genus 1: Aspergillus and Genus 2: Penicillium their role in biotechnology. The role of some strains in production of biomaterials, food manufacturing, plant pathogens, Human pathogens. Series 2: Pyrenomycetes: which involve 5 orders**:** Order 1: Erysiphales,

	Order 2: Chaetomyales, Order 3: Claviceptales, Order 4: Shpaeriales and Order 5: Hypocreale
Week 10	Division 2: Eumycota, Class 5: Ascomycetes, Series 3: Discomycetes**:** general characteristics, This Series classified into two groups: Group 1: Hypogean: which presence under the surface of soil. Group 2: Epigean Subclass 3: Loculoascomycetidae
Week 11	Division 2: Eumycota, Class 6: Basidiomycetes, general characteristics, Subclasses involved in this class. Subclass 1: Heterobasidiomycetidae, general characteristics, This subclass involves two orders: Order 1: Uredinales (Rust fungi) Order 2: Ustilaginales (Smut fungi) These two orders contain very economically important strains.
Week 12	Division 2: Eumycota, Class 6: Basidiomycetes, Subclasses 2: Holobasidiomycetidae, general characteristics. The role of some strains in production of enzymes such laccase, peroxidase, cellulose, Edible and poising mushroom.
Week 13	Division 2: Eumycota, Class 7: Deutromycetes, general characteristics, Orders involved in this class. Order 1: Moniliales, Order 2: Sphaeropsidales, Order 3: Melanconiales And Order 4: Mycelia sterile
Week 14	Medical mycology which involve: classification of this fundi according to the site of infection.
Week 15	Mycotoxins which involve the main groups of mycotoxins.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction
Week 2	Lab 2: Isolation of fungi
Week 3	Lab 3: Fungal classification (Division: Myxomycota)
Week 4	Lab 4: Division: Eumycota Subdivision: Mastigomycotina Class: Chytridiomycetes
Week 5	Lab 5: Division: Eumycota Subdivision: Mastigomycotina Class: Oomycetes
Week 6	Lab 6: Division: Eumycota Subdivision: Mastigomycotina Class: Zygomycetes
Week 7	Lab 7: Subdivision: Ascomycotina Class: Hemiascomycetes (Protoascomycetes)
Week 8	Lab 8: Subdivision: Ascomycotina Class: Ascomycetes Subclass: Plectomycetidae
Week 9	Lab 9: Subdivision: Ascomycotina Class: Ascomycetes Subclass: Loculloascomycetidae

Week 10	Lab 10: Subdivision: Ascomycotina Class: Ascomycetes Subclass: Discomycetidae

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introductory mycology by Alexopoulos, C.J and C.W.Minis. Third edition.	Yes
Recommended Texts	Introduction to fungi by John Webster and Roland W.S.Weber 2007. Cambridge.	Yes
Websites	https://www.Mycology	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Semester Six

BIOTMODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microbial Genetics**			**Module Delivery**	
Module Type	**CORE**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	BIOT36025				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	د اثمار عدنان حكمان .م			اليميل : athmaradnan@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name					
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	30. Introduce students to one of the branches of genetics, which is the inheritance of microorganisms, and to study all the factors that participate in showing the facts of the genetic matters of microorganisms. 31. Understanding microbial genes, genomes, and gene expression is essential for understanding the biology and evolution of microorganisms and their interactions with the environment. 32. Microbial genetics is important for understanding molecular techniques used to study the genes and proteins, for bacteria, archaea, and eukaryotic organisms for fundamental research as well as practical applications in diverse areas of medicine and biotechnology. 33. Studying a brief history for the inheritance of microorganisms, the use of bacteria in genetic studies, and multiplication the DNA of bacteria and phages (prokaryotic), mutations and their types. 34. To illustrate at an advanced level how microbial genetic systems contribute to the current understanding of molecular processes involved in the replication, recombination, and repair of genomes and their differential expression in response to environmental stimuli. 35. Understand the mechanisms underlying bacterial recombination and get information on PCR,and how to interpret and analyses the obtained outcome. 36. Understanding of fundamental concepts in microbial genetics. 37. Microbial genetics focuses on bacterial recombination, mobile elements ,mechanisms of gene transfer (conjugation, transformation and transduction), 38. To develop knowledge skills and understanding of microbial genetics theory through some application techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	41. Insight into genetic methods used to investigate interesting biological problems. 42. Insight into current, exciting topics in microbial genetics and related fields. 43. Understanding of how microbial genetics has advanced science and society. 44. Discuss the structure, function, expression, and evolution of microbial genes and methods for their study. 45. Learning about mutation and the available techniques for selecting and isolating mutated bacterial cell. 46. Discuss the bacterial gene transfer and their various molecular biological applications. 7.Learning what is related to it vector elements include , plasmids, phage

	and transposone , mechanisms of gene transfer (conjugation, transformation and transduction), recombination and repair of defects. 8.Discuss research and review articles related to both fundamental concepts and emerging topics in microbial genetics. 9-Learning the ability to extract and purify nucleic acid and conduct genetic tests. 10-Get introduced to Polymerase chain reaction and how this technique helps in gene detection through designing primers that are complimentary to targeted genes. 11-The ability to conduct various laboratory experiments related to genetic diagnosis for bacteria and viruses to research and prepare a report of their findings. 12-Analyzing genetically the functioning and mechanism of cells. 13-Identify the basic of microbial genetics and their applications.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	**The indicative content of Molecular biology includes the following.** **Lec1: Introduction to Genetics of Microorganisms** **A-Advantages for using bacteria and viruses for genetics study** **B-Classification of Organisms** **C-The Bacterial Genome** **D-Bacteria Were Used for Fundamental Studies of Cell Function** **E-Viruses and Bacterial Viruses(phages)** [15 hrs] **Lec2: Replication in Bacteria** **A-Types and principle of replication.** **B-The mechanism of replication.** **C-The role of enzymes in replication.** **C-Replication in phage and archaebacteria** **D-types of replication in plasmids** **Lec3: A-Overview of DNA Repair** **B-Types of repair system** **1-profreading repair** **2- DNA Mismatch Repair System** **3-General Excision Repair System** **4-Photoreactivation Cleaves Thymine Dimers** **Lec4: Transcription in Bacteria** **A-RNA Molecules** **B-The Structure of RNA** **C-Transcription: Synthesizing RNA from a DNA Template** **D-The Substrate for Transcription** **E-The Process of Bacterial Transcription** **Lec5: Translation in Bacteria** **A- Bacteria-Synthesizing proteins (amino acids) from RNA** **B-The Substrate for Translation** **C-The Process of Bacterial Translation .** **Lec6: A-Definition of mutations**

	B-Classification of mutation . **C-Nomenclature of mutatin** **D-Mechanisms of mutations.** **E-The influence of chemicals and phiscal agents among mutations** **Lec 7: A-Luria and Delbruck experiment.** **B-The Newcombe experiment .** **C-The Lederbergs experiment.** **D-Mutation rates** **E-Calculation mutation rates.** **Lec8**: mobile elements :the plasmids **A-The Characteristic features of Plasmid** **B-Classified plasmids according to the function.** **C-Plasmids replication and control** **Lec9:** A-**The Nature of Transposable Elements** **B-General Characteristics of Transposable Elements** **C-Mechanisms of Transposition** **D-Types of transposable Elements in Bacteria** **Lec10**: **A-the Bacteriophage** **B-Types of cycle in Bacteriophages** **C-Techniques for the Study of Bacteriophages** **Lec11: Genes Transfer in Bacteria** **A- Bacterial Conjugation** **B- Methods of Conjugation** **C- Role of conjugation in bacterial evolution** **D- The conjugation of Gram-positive** **Lec12: Gene Transfer by Transformation** A- **Transformation is Gene Transfer by Naked DNA** B- **Transformation as Proof that DNA is the Genetic Material** C- **Transformation in Nature** D- **Artificially Induced Competence** **E-Transformation by plasmids** **F-Transfection** **Lec13: Gene Transfer by Virus—Transduction** **A- Types of transduction** **1-Genrlized transduction** **2-specialized transduction** **B-phages and gene transfer,lytic and lysogenic cycles.** **C-Techniques for the Study of Bacteriophages** **Lec 14:Regulation of Gene Expression** **A- Transcriptional regulators** **B- the lac Operon** **C-types of enzymes in lac operon**

	D-Mutations and the *lac* Operon **Lec 15:** A- ***trp* Operon and Attenuation** **B- types of enzymes in *trp* operon** **C-Sequence of Events for Attenuation**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, scientific visits, and by considering types of simple experiments involving interesting sampling activities for the students. It can be summarized in the following points: 1-Qualifying students to solve problems related to the intellectual framework of the foundations and applications of microbiological inheritance 2- Encouraging students to visit the library to obtain academic knowledge related to academic vocabulary. 3- Improving students' skills by visiting websites to obtain additional knowledge of academic subjects. 4- brainstorming during the lecture 5-To qualify students to obtain knowledge and understanding of microbial genetics, 6-Contribute to preparing correct scientific thinking for students to solve obstacles in the fields of scientific research 7-Expand students' perceptions to get acquainted with modern technologies adopted globally

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعاتملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية

		Time /Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 3, and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8,9 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Genetics of Microorganisms
Week 2	Replication in bacteria and viruses
Week 3	Types of repair system
Week 4	Transcription in Bacteria
Week 5	Translation in Bacteria
Week 6	Mutation
Week 7	Inheritance in bacteria
Week 8	Mobile elements: The Plasmids
Week 9	Mid-term Exam + Movable Genes
Week 10	Viral Genetics
Week 11	Gene Transfer: 1-Conjugation
Week 12	Gene Transfer: 2-Transformation
Week	Gene Transfer:

13	3-Transduction
Week 14	Regulation of Gene Expression 1-Lactose operon
Week 15	Regulation of Gene Expression 2-Tryptophan operon
Week 16	The preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	**Lab 1:** General concept of Transformation
Week 2	**Lab 2:** Practical/ transformation (studying the transferring of genetic material by the method of transformation)
Week 3	**Lab 3:** General concept of conjugation
Week 4	**Lab 4:** Practical / conjugation (studying the transferring of genetic material by the method of conjugation)
Week 5	**Lab 5:** General concept of specialized and generalized transduction
Week 6	**Lab 6:** Practical / generalized transduction studying the transferring of genetic material by the method of transduction
Week 7	**Lab 7:**Isolation of mutant bacteria Learn the types of mutation./ molecular level, isolation.
Week 8	**Lab 8: :** General concept of PCR
Week 9	**Lab 9** : Practical/ PCR - PCR calculation
Week 10	**Lab 10:** Primer design\ Using NCBI

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Molecular Genetics of Bacteria.4th EditionJeremy W. Dale and Simon F. Park ,2014.** -1 **2-Genetics.Leland H.Hartwell .(2000) 3-Color atlas of genetics Eberhad و Passarge. (2001).**	Yes

Recommended Texts	**Molecular Microbiology. David H. Persing.; Fred C. Tenover Randall T. Hayden.;Margareta Ieven.; Melissa B. Miller.;Frederick S. Nolte.;Yi-Wei Tang.;Alex van Belkum.(2016).** DIAGNOSTIC PRINCIPLES AND PRACTICE THIRD EDITION	No
Websites	https://microbiologynote.com/best-and-top-books-for-microbial-genetics-and-molecular-biology/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Food Biotechnology**	**Module Delivery**
Module Type	**Core**	**☒ Theory** **☒ Lecture**

Module Code	BIOT36026			☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
ECTS Credits	**5**			
SWL (hr/sem)	**125**			
Module Level	11 UGIII	**Semester of Delivery**	6	
Administering Department	Type Dept. Code	**College**	Type College Code	
Module Leader	Zainab Abd Mohamed		Zainababed@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Name	**e-mail**	E-mail	
Scientific Committee Approval Date	6/8/2025	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	39. To learn general concepts of food microbiology and important microorganisms in food. 40. To understand the microbiological standard of food. 41. This course deals with the basic concepts of microbial growth and the factors influencing microbial growth in food. 42. To identify the microorganisms that cause food spoilage. 43. To identify the foodborne disease-causing microorganisms.

	44. To protect food from contamination and spoilage by knowing the controlling methods of microorganisms in food. 45. To develop skills for detecting microorganisms that cause food spoilage and foodborne diseases.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	47. Enable students to obtain knowledge and understanding of food microbiology. 48. List the various terms associated with food microbiology. 49. Define important bacterial genera associated with food. 50. Summarize the common microbial spoilage in foods. 51. Discuss the factors influencing microbial growth in food. 52. Describe the microbiological standard for food. 53. Describe the spoilage of every specific food group. 54. Identify food spoilage caused by microbial enzymes. 55. Explain the three microbial foodborne diseases based on illness mode. 56. Explain the parasites that cause foodborne diseases. 57. Identify indicators of bacterial pathogens. 58. Identify the different control methods for microorganisms in food.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	Indicative content includes the following. <u>Part A – General concepts</u> Introduction to food microbiology – History and development of food microbiology, Discovery of microorganisms, what are their functions, Development of food microbiology, Characteristics of predominant microorganisms in food, Important microorganisms in food (important mold genera, important yeast genera, important viruses, important bacterial genera), Sources of microorganisms in food, Microbiological standard of food, Bacteriological standard of food, Common Microbial Spoilage of foods, Microbial growth characteristics, Factors influencing microbial growth in food . [20 hrs] <u>Part B -The spoilage of food</u> Microbial food spoilage - Important factors in microbial food spoilage (significance of microorganisms, significance of foods), Spoilage of Specific Food Groups (meat, egg, milk, Vegetables, fruits, and nuts, Cereals, Canned food, Sugars and confectioneries, drinks, Mayonnaise and salad dressing, Spices and condiments, Pickles), Food Spoilage by Microbial Enzymes. [14 hrs] <u>Part C -The foodborne diseases</u> Microbial foodborne diseases– Important facts in Foodborne diseases, Foodborne Intoxications, Foodborne Infections, Foodborne Toxicoinfections, parasites, indicators of bacterial pathogens. [14 hrs] <u>Part D -The control of food spoilage</u>

	Control of microorganisms in food– Control of access (cleaning and sanitation), Control by physical removal, Control by heat, Control by low temperature, Control by reduced Aw, Control by Low pH and organic Acids, Control by modified atmosphere (or reducing O–R potential), Control by antimicrobial preservatives, Control by irradiation. [12 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	61	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects /	1	10% (10)	Continu	All

	Lab.			ous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	History and development of food microbiology
Week 2	Characteristics of predominant microorganisms in food
Week 3	Sources of microorganisms in food
Week 4	Microbiological standard of food
Week 5	Microbial growth characteristics
Week 6	Factors influencing microbial growth in food
Week 7	Microbial food spoilage (Important factors in microbial food spoilage)
Week 8	Microbial food spoilage (Spoilage of Specific Food Groups, P1)
Week 9	Microbial food spoilage (Spoilage of Specific Food GroupsP2, Food Spoilage by Microbial Enzymes)
Week 10	Microbial foodborne diseases (Important Facts in Foodborne Diseases, Foodborne Intoxications)
Week 11	Microbial foodborne diseases (Foodborne Infections, Foodborne Toxicoinfections)
Week 12	Microbial foodborne diseases (Parasites, Indicators of Bacterial Pathogens)
Week 13	Control of microorganisms in food (Control of access (Cleaning and Sanitation), Control by physical removal, Control by Heat)
Week 14	Control of microorganisms in food (Control by Low Temperature, Control by Reduced Aw, Control by Low pH and Organic Acids)
Week 15	Control of microorganisms in food (Control by Modified Atmosphere (or Reducing O–R Potential), Control by Antimicrobial Preservatives, Control by Irradiation)

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Preparation of Samples Part 1
Week 2	Lab 2: Preparation of Samples Part 2
Week 3	Lab 3: Methods for Microbiological Examination of Foods
Week 4	Lab 4: Microbiological Examination of Milk
Week 5	Lab 5: Mid Exam 1
Week 6	Lab 6: Microbiological examination of Fruits and Vegetables
Week 7	Lab 7: Microbiological Examination of Table Eggs
Week 8	Lab 8: Canned Food
Week 9	Lab 9: Why you should avoid Canned food
Week 10	Lab 10: Toxins (Poisons)
Week 11	Lab 11: Mid Exam 2

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	-Food microbiology (Mantrile TY,1987) -Food Microbiology Laboratory Manual(Venata Vedum-Mai and Melissa J)	Yes
Recommended Texts	-Fundamental food microbiology (Bibek Ray,2004) - Practical food microbiology (D Robert & M Green wood, 2003)	No
Websites	https://www.coursera.org/learn/industrial-biotech https://www.youtube.com/channel/UCJlzzBwuorwLbviAhEgbnqQ	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Mar**	**Definition**

			ks (%)	
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Immunology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	BIOT36027		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	11 UGIII	**Semester of Delivery**	6
Administering Department	Type Dept. Code	**College**	Type College Code
Module	Duha Farhan Nasrallah		dhuha.f.n.bani_wais@uodiyala.edu.iq

Leader			
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name			
Scientific Committee Approval Date	6/8/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	46. To develop knowledge skills and understanding of Immunology theory through some application techniques. 47. To understand antigen and immunoglobulin types, innate and adaptive immunity, body molecules related to immunity, and immune response measurement. 48. This course deals with the basic concept of Immunology. 49. This is the basic subject for genetic immunology and immune diseases. 50. To perform practical analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	59. Recognize how the immune system works in the human and animal body. 60. List the various terms associated with immunology. 61. Summarize what is meant by antigens and antibodies, and other immune molecules in the immune system. 62. Discuss the reaction and involvement of antigens and antibodies in immunology. 63. Define and describe innate and adaptive immunity. 64. Identify the basic immune molecules and their applications. 65. Discuss the immune response in innate and adaptive immunity. 66. Discuss the various properties of immune molecules.

	67. Explain the genetic bases of immune molecules. 68. Identify the relationship between innate and adaptive immunity.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	The indicative content of Immunology includes the following. **Lec1: Immunology – Immune system** definitions, immune soluble and cellular components, Antigen types, types of immunity, types of the immune response, and immunoglobulin types. [15 hrs] **Lec 2: Innate immunity** – definition, cells and soluble components of innate immunity, mechanisms of innate immunity, phagocytosis and killing mechanisms, types of innate immunity, roles of innate immunity in the body defenses, generation, and development of innate immune components. **Lec 3: The internal defense system**, lymphoid system including; primary lymphoid organs and secondary lymphoid organs. **Lec 4: Third line of defense: Acquired or developed or adaptive immunity**; characteristics of acquired immunity, types, cells related with adaptive immunity, development of lymphocytes, types of lymphocytes and development. **Lec 5: immunogens and antigens**, definition, differentiation between both items, differentiation between immunogenicity and antigenicity, types and chemical structure of antigens, types of antigens on the bases of their origin, the requirement for immunogenicity, adjuvants, primary and secondary responses. **Lec 6: T dependent and T independent antigen**, main features of T dependent antigen, humoral immune response, the biological role of humoral immune response, cell-mediated immune response, and stages of adaptive immune response development. **Lec 7: Major histocompatibility molecules**, types, functions, structures, genetic and protein organization of MHC types on the chromosome. **Lec 8: Antibodies**, structures chemical compositions, antibody regions, differentiation among each antibody, functions, random mutation and class switching, and natural antibody. **Lec 9: classes of immunoglobulins**, general properties, IgG characteristics, and biological properties, IgA characteristics and biological properties, IgE characteristics and biological properties, IgD characteristics and biological properties, and IgM characteristics and biological properties. **Lec 10: Complement system**, functions of complement, complement pathways, anaphylotoxins, and the importance of complement membrane attack complex.

	Lec 11: Hypersensitivity, types of antigens and reaction, types of hypersensitivity reactions, type I hypersensitivity, anaphylactic reaction. **Lec 12**:**type II hypersensitivity, type III hypersensitivity, type IV hypersensitivity** **Lec 13: Cytokines and chemokines:** pro-inflammatory cytokines, pre-inflammatory cytokines **Lec 14: Antigen–antibody reactions (part 2),** stages of Ag-Ab reactions, measurement of Ag-Ab reactions, precipitation, application of precipitation, immunodiffusion technique, single diffusion in two dimensions, and ouchterlony technique. Immunoelectrophoresis, agglutination, agglutination mechanism, application of agglutination, slide agglutination. **Lec 15: Antigen–antibody reactions (part 3),** immunofluorescence, Enzyme immunoassay, direct and indirect ELISA, competitive ELISA, flow cytometer.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, scientific visits, and by considering types of simple experiments involving interesting sampling activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 3, and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8,9 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Immunology –Introduction to Immune System
Week 2	Innate immunity
Week 3	The internal defense system
Week 4	The third line of defense: Acquired or developed or adaptive immunity
Week 5	Immunogens and antigens
Week 6	T-dependent and T-independent antigen
Week 7	Mid-term Exam + Major histocompatibility molecules
Week 8	Antibodies
Week 9	Classes of immunoglobulins
Week 10	Complement system
Week	Hypersensitivity/ introduction, types of antigens, type I hypersensitivity, anaphylactic

11	reaction.
Week 12	Type II hypersensitivity, type III hypersensitivity, type IV hypersensitivity
Week 13	Cytokines and chemokines
Week 14	Antigen-antibody reactions I
Week 15	Antigen-antibody reactions II
Week 16	The preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	**Lab 1: Introduction in practical immunity**
Week 2	**The bactericidal activity of serum**
Week 3	**Antigen Preparation**
Week 4	**Rosetting Techniques**
Week 5	**ABO blood grouping**
Week 6	**Phagocytosis**
Week 7	**Exam - Serological tests**
Week 8	**Enzyme-Linked Immunosorbent Assays (ELISA)**
Week 9	**Complement fixation test**
Week 10	**Review and rendering all labs**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lippincott's Illustrated Reviews - Immunology (Thao Doan, Roger Melvold)	Yes

Recommended Texts	Essential clinical immunology/ *Edited by* John B. Zabriskie/ *The Rockefeller University*	No
Websites	https://www.microbiologybook.org/book/immunol-sta.htm	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 – 100	Outstanding Performance
	B - Very Good	جيد جدا	80 – 89	Above average with some errors
	C - Good	جيد	70 – 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Environmental Biotechnology**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	BIOT36028	
ECTS Credits	**5**	

SWL (hr/sem)	**125**				
Module Level	11 UGIII		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Esam Hamid Hameed Hummadi			Email: esam_hummadi@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor					
Peer Reviewer Name					
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	51. Exploitation of microorganisms for production of different biomolecules, organic acids etc. 52. Development of different biological system for waste treatment resulted from municipals and industries. 53. Recycling of wastes and production of biofuels and biofertilizres 54. Monitoring the fate of pollutants in the Environment 55. Biological control of pathogens and pest using microorganisms and microbial products
Module Learning Outcomes مخرجات التعلم للمادة	69. To understand the concept of Environmental Biotechnology and the field dealing with Environmental biotechnology 70. Learning the students, the operation and application of Techniques used

الدراسية	in biological treatment of waste in laboratory and in the field. 71. Enabling the students to use different treatment process for metabolism and removal of Nitrogen compounds, Metabolism of phosphorous compounds, Metabolism of Sulphur compounds, Reduction of CO2 emission through biological treatment. 72. Identify the students the concept of Biodegradation and the process adopted for biodegradation process such as Aerobic and anaerobic degradation in lab or in the field. 73. Learning the students, the possibility of Biodegradation of different pesticides used in agriculture or in municipality for treatment of pest in lab or in the field. 74. Enabling of students, to applied Bioremediation techniques for removal and treatment of pollutants from the environment in the field. 75. Possibility to applied large scale bioreactors for production of biosurfactant in order to be used in different fields such as in oil recovery, medical, agriculture and industrial applications. 76. To understand the concept of Bio sorption or Metal Uptake by Microorganisms and recovery by microbes from bioleaching, bio sorption, direct or indirect leaching process. 77. Learning the possibility of application of microorganisms and Microbial pesticides (bactericidal, fungicidal, insecticidal, etc.), for pest control. 78. Development the power of students in working and application of Anaerobic processes for waste treatment and bioenergy production. 79. Learning the student's solid wastes treatment in the field such as using exsitu treatment (composting and methane production).
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	**Indicative content includes the following**: 1. Definition and Importance of Environmental Biotechnology. Biological Treatment Process, Techniques used in biological treatment. 2. Biological treatment by activated sludge, Source of wastewater, Types of bacteria in activated sludge, Microbial processes 3. Environmental Treatment: Metabolism of Nitrogen compounds, Phosphorous, Sulfur compounds and Reduction of CO2 emission through biological treatment (Algal photosynthesis). 4. Biodegradation, Factors that effect in biodegradation, Aerobic and anaerobic degradation, The advantages and disadvantages of anaerobic process. 5. Biodegradation OF HERBICIDES AND PESTICIDES, and HYDROCARBONS. 6. Bioremediation of Environmental Pollutants, in situ bioremediation: and Ex situ bioremediation. 7. Bio surfactant, Biosurfactant Classification, mechanisms of biosurfactant interaction, Major biosurfactant classes and Applications of Biosurfactants.

	8. Bio sorption or Metal Uptake (Recovery) By Microorganisms, Bio - Sorbent Microbial Groups: Bacteria, Fungi, Microbial Mechanisms for Removal of Metal Ions. 9. Microbial pesticides, Bacteria pesticides: Bacillus sp., Mechanism of action of Bacillus thuringiensis on caterpillars. 10. Mechanisms of biological control: Direct antagonism, Antibiotic-mediated suppression, Lytic enzymes and other microbial byproducts. 11. Anaerobic processes and bioenergy; Treatment of different wastes. 12. Solid wastes treatment: sources and management 13. Biomedical waste treatment; sources; types; collection; and treatment

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the field studies for treatment of different types of wastes using biological system, produced beneficial products, pest management and restoration of environmental quality according to the acquired skills from the theoretical and practical information through lectures and Lab.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية				
	Time /Nu	**Weight (Marks)**	**Week Due**	**Relevant Learning**

		mber			Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #2, 3, 4 , 9 and 10
	Assignments	2	10% (10)	2, 12	LO # 2, 4, 8 and 11
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 2, 4, 7 and 10
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Importance of Environmental Biotechnology, field dealing with Environmental biotechnology Bio-methylation and bio magnification, Important terms in Environmental Biotechnology
Week 2	Biological Treatment Process, Techniques used in biological treatment, Suspended growth process (Activated sludge), Process variables used in control of the biological processes, Attached film growth: Trickling Filter, Rotating Biological Contactor (RBC), Fluidized beds.
Week 3	Biological treatment by activated sludge, Source of wastewater, The nature and composition of waste water, Soft and hard organic matter (BOD) digestion, Microbial ecology: Activated sludge bacteria, Types of bacteria in activated sludge, Bacterial flocs, Microbial processes: ingestion, respiration and growth and division, Factors effects the Growth of bacteria: Substrate concentration, Availability of the nutrients, oxygen and Temperature.
Week 4	Environmental Treatment: Metabolism of Nitrogen compounds, Source of nitrogen compounds, nitrogen removal: ammonification, nitrification, and denitrification, Metabolism of phosphorous compounds, Metabolism of Sulphur compounds, Reduction of CO2 emission through biological treatment, Wastewater treatment (Algal photosynthesis), Eutrophication, Eutrophication causes and treatment
Week 5	Biodegradation, Factors that effect in biodegradation, Types of hydrocarbons highly hazardous and poising, Examples of microbial strains with suitable degradative potentials, Aerobic and anaerobic degradation, Some anaerobic process which, may occur

	in some soils or sediments, The advantages and disadvantages of anaerobic process, Sequential degradation.
Week 6	Biodegradation OF HERBICIDES AND PESTICIDES, Co-metabolism of MCA and MCPA, Biodegradation OF HYDROCARBONS, (a) Aliphatic hydrocarbons (b) Aromatic hydrocarbons, Biodegradation OF SOME SPECIFIC WASTES , TESTING FOR BIODEGRADABILITY.
Week 7	Mid-term Exam.
Week 8	Bioremediation of Environmental Pollutants, Principles of Bioremediation, Characteristics of Microbial Populations for Bioremediation Processes, Mechanisms of oxidation, Environmental Factors effects bioremediation: Nutrients, temp. etc. Bioremediation Strategies: *in situ* bioremediation: Bioventing, Biosparging and Bio-augmentation, Ex situ bioremediation: Land farming, Composting and Bioreactors, Advantages and disadvantages of bioremediation
Week 9	Bio surfactant in microbiology and biotechnology, Biosurfactant Classification and Their Microbial Origin, The mechanisms of biosurfactant interaction with cell membrane of Gram negative bacteria, Major biosurfactant classes and microorganisms involved, Physiological Role of Biosurfactants, Kinetics of biosurfactant production, Advantages of biosurfacants compared to their chemically synthesized surfactant, Applications of Biosurfactants in different fields.
Week 10	Bio sorption or Metal Uptake (Recovery) By Microorganisms, Metal recovery by microbes: bioleaching, bio sorption, direct or indirect leaching process, BIOSORPTSON, Bio - Sorbent Microbial Groups: Bacteria, Fungi, Microbial Mechanisms for Removal of Metal Ions: Immobilization, Volatilization, Extracellular Precipitation, intracellular Accumulation, Oxidation-reduction Reactions, Adsorption to Cell Surfaces
Week 11	Microbial pesticides, Advantages of Microbial pesticides, Disadvantages of Microbial Pesticides, Bacteria pesticides: Bacillus sp., Mechanism of action of *Bacillus thuringiensis* on caterpillars, Bt formulations that are now commercially available, maximize the effectiveness of Bt treatments.
Week 12	Mechanisms of biological control: Direct antagonism, Types of interspecies antagonisms leading to biological control, Antibiotic-mediated suppression, Some of antibiotics produced by microorganism for pest suppression, Lytic enzymes and other microbial byproducts for pest control.
Week 13	Anaerobic processes and bioenergy: anaerobic digestion, anaerobic filters, up flow anaerobic sludge blanket reactors; Treatment of dairy, fertilizer, tannery, sugar, and antibiotic industries waste waters.
Week 14	Solid wastes treatment: sources and management (composting, worm culture and methane production).
Week 15	Biomedical waste treatment; sources; types; collection; and treatment
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Introduction to environmental Biotechnology
Week 2	Biremedation, basic strategies, factors affect Biremedation, Biostimulation, laboratory procedure
Week 3	Bioabsorption of heavy metal by microorganism
Week 4	Biodegradation of Phenol compounds
Week 5	Biodegradation of hydrocarbone compounds
Week 6	Biodegradation of aromatic hydrocarbone
Week 7	Bioflim, stages for biofilm formation, types of pollutants remediated by Biofilms, lab. procedure
Week 8	Production of biosurfactant by bacteria, application of biosurfactant, groups of biosurfactant, substrates of biosurfactant
Week 9	Production of cellulase by microorganism
Week 10	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Chatterji, A.K. 2003. Introduction to Environmental Biotechnology. 2. Eugenia, et. al., 2003. Environmental Biotechnology and cleaner process. 3. Thomas, D. B., 1990. Biotechnology: A text book of industrial microbiology.	Yes
Recommended Texts	Waste water microbiology third edition Environmental biotechnology, second edition	Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success	**A** -	امتياز	90 -	Outstanding Performance

Group (50 - 100)	Excellent		100	
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Antibiotics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	BIOT36029				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	11 UGIII		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zainab Amer Hatem			Email: Zainabamer@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	

Module Tutor		**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	6/8/2025	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	56. Understand the Principles of Antimicrobial Therapy 57. Explore Bacterial Resistance Mechanisms 58. Recognize the Clinical Use of Antibiotics 59. Interpret Antibiotic Susceptibility Testing 60. Understand the adverse effects, contraindications, and drug interactions of common antibiotics. 61. Introduce newer antibiotics and strategies to combat multidrug-resistant organisms (MDROs).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Describe the major classes of antibiotics and their mechanisms of action against bacterial targets. Differentiate between bactericidal and bacteriostatic agents based on their effects on microbial cells. Explain how bacteria acquire and express resistance through genetic and biochemical mechanisms. Interpret antibiotic susceptibility testing results (e.g., MIC, zone of inhibition) and apply them to clinical decision-making. Evaluate the appropriate use of antibiotics for various types of infections based on pathogen, site, and host factors. Discuss the principles and importance of antimicrobial stewardship in reducing resistance and preserving antibiotic efficacy. Identify common adverse effects and contraindications of major antibiotic classes. Apply knowledge of combination antibiotic therapy to clinical scenarios involving resistant or mixed infections.

	Analyze current trends and challenges in antibiotic resistance and new antibiotic development. Demonstrate responsible attitudes towards the use of antibiotics in clinical and public health settings.
Indicative Contents المحتويات الإرشادية يتضمن الكلمات المفتاحية المهمة للمحاضرات	**Introduction to Antimicrobials** • History and discovery of antibiotics • Classification: antibacterial, antifungal, antiviral, antiparasitic agents **Mechanisms of Action** • Inhibition of cell wall synthesis (e.g., beta-lactams, glycopeptides) • Inhibition of protein synthesis (e.g., aminoglycosides, tetracyclines, macrolides) • Inhibition of nucleic acid synthesis (e.g., quinolones, rifampicin) • Disruption of cell membrane function (e.g., polymyxins) • Antimetabolites (e.g., sulfonamides, trimethoprim) **Pharmacokinetics and Pharmacodynamics of Antibiotics** • Absorption, distribution, metabolism, and excretion • Time-dependent vs. concentration-dependent killing **Antibiotic Resistance** • Types: intrinsic, acquired, adaptive • Mechanisms: enzyme production (e.g., beta-lactamases), efflux pumps, target modification • Horizontal gene transfer and mobile genetic elements **Antibiotic Susceptibility Testing** • Methods: disk diffusion, MIC, E-test, automated systems • Interpretation and clinical relevance **Clinical Use of Antibiotics** • Empirical vs. targeted therapy • Site-specific antibiotic selection (e.g., CNS, respiratory, urinary tract infections) • Narrow vs. broad-spectrum antibiotics **Adverse Effects and Toxicity** • Allergic reactions, organ toxicity, Clostridioides difficile infection • Drug-drug interactions **Antibiotic Stewardship** • Strategies to promote appropriate use • Role of guidelines and infection control policies **Combination Therapy and Synergy** • Rationale and clinical scenarios • Synergistic and antagonistic combinations **Emerging Antibiotics and Global Challenges** • Multidrug-resistant organisms (MDROs) • Novel antibiotic development and resistance surveillance **Case Studies and Clinical Applications** • Interpretation of lab reports • Selection of appropriate antibiotic regimens

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. **Lectures with Visual Aids** o Use PowerPoint slides, infographics, and animations to explain complex mechanisms (e.g., bacterial resistance, antibiotic action). o Highlight key concepts using case-based discussion points. 2. **Case-Based Learning (CBL)** o Present clinical scenarios to encourage application of knowledge to real-life antibiotic selection and resistance interpretation. 3. **Small Group Discussions** o Encourage students to discuss antibiotic choices, resistance patterns, and stewardship challenges in small peer groups. 4. **Interactive Quizzes and Polls** o Use tools like Kahoot, Socrative, or in-class polling to review material and identify areas needing clarification. 5. **Laboratory Practical Sessions (if applicable)** o Hands-on training in antibiotic susceptibility testing (e.g., Kirby-Bauer method, MIC determination). 6. **Problem-Based Learning (PBL)** o Guide students through structured clinical problems that require integrating microbiology, pharmacology, and patient care. 7. **Role-Playing / Simulated Prescribing** o Have students act as clinicians, interpreting culture results and selecting antibiotics using guidelines and evidence. 8. **Research and Presentation Projects** o Assign topics like "Recent advances in antibiotic development" or "Global strategies to combat AMR" for student-led presentations. 9. **Flipped Classroom** o Assign recorded lectures or readings before class, using in-person time for active problem-solving or discussion. 10. **Guest Lectures** • Invite infectious disease specialists or pharmacists to provide real-world perspectives on antimicrobial therapy and stewardship. 11. **Use of E-learning Platforms** • Provide access to online modules, WHO AMR resources, or antimicrobial prescribing tutorials.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا تملئ من قبل المقررية			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.06
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 3, 5 , 8 and 12
	Assignments	2	10% (10)	2, 12	LO # 2, 4, 6 and 9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 3, 5, 6 and 9
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Antibiotics,History, discovery, classification of antibioticsLecture + introductory quiz
Week 2	Mechanisms of Action I Cell wall inhibitors (e.g., beta-lactams, glycopeptides) Visual aids, mechanism animation, MCQs
Week 3	Mechanisms of Action II ,Protein synthesis inhibitors (e.g., aminoglycosides, macrolides, tetracyclines), Case comparisons: bacteriostatic vs. bactericidal
Week 4	Mechanisms of Action III DNA/RNA synthesis inhibitors (e.g., quinolones, rifampin), membrane disruptors, antimetabolites Drug matching exercise
Week 5	Mechanisms of Action III ,DNA/RNA synthesis inhibitors (e.g., quinolones, rifampin), membrane disruptors, antimetabolites ,Drug matching exercise

Week 6	Mechanisms of Resistance, Enzymatic degradation, efflux pumps, target modification, biofilms, genetic transfer, Video + worksheet + discussion
Week 7	Mid-term Exam.
Week 8	Laboratory Identification & Susceptibility Testing ,Culture-based methods, MIC, disk diffusion, E-test, interpreting antibiograms ,Practical lab session or virtual simulation
Week 9	Adverse Effects & Toxicity, Common side effects, hypersensitivity, nephrotoxicity, hepatotoxicity, C. difficile ,Adverse event case studies
Week 10	Antibiotic Combination Therapy Synergism, antagonism, clinical uses (e.g., TB, endocarditis), fixed-dose combinations Group presentations on combination regimens
Week 11	Antibiotic Stewardship & Global Challenges Principles of stewardship, overuse/misuse, hospital protocols, WHO & CDC initiatives Guest lecture or stewardship simulation
Week 12	Emerging Threats & New Antibiotics MDR, XDR organisms, novel agents, resistance surveillance programs Research posters or peer-reviewed article discussions
Week 13	Emerging Threats & New Antibiotics MDR, XDR organisms, novel agents, resistance surveillance programs Research posters or peer-reviewed article discussions
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Introduction to Lab Safety & Aseptic Technique - Understand lab safety protocols - Perform aseptic techniques for culture handling - Use of biosafety cabinets - Streak plating and pipetting practice
Week 2	Antibiotic-Producing Microorganisms- Isolate potential antibiotic-producing soil microbes- Soil dilution plating- Primary screening (cross-streak method)
Week 3	Kirby-Bauer Disk Diffusion Method- Learn disk diffusion technique - Interpret zone of inhibition- Inoculation of Mueller-Hinton agar- Apply antibiotic disks- Measure zones Lab report with results and interpretation
Week 4	Determination of Minimum Inhibitory Concentration (MIC) - Understand MIC and dilution principles - Broth dilution method or E-test- Analyze turbidity and growth MIC chart + comparative table
Week 5	Effect of Antibiotics on Gram-Positive vs. Gram-Negative Bacteria - Compare antibiotic sensitivity across cell wall types - Parallel testing on E. coli and S. aureus
Week 6	Combination Therapy and Synergy Testing - Understand synergy/antagonism -

	Checkerboard assay or disk diffusion synergy test
Week 7	Antibiotic Susceptibility Profile Report (Capstone Lab) - Apply all techniques to analyze a clinical isolate - Receive unknown sample - Perform ID, disk diffusion, MIC
Week 8	**Screening for Antibiotic-Producing Microbes - Isolate soil bacteria** **- Understand natural antibiotic production - Soil dilution** **- Streaking onto actinomycete agar** **- Cross-streak method**
Week 9	Lab Orientation, Biosafety & Aseptic Technique - Understand BSL-2 safety - Master sterile handling of bacteria - Aseptic technique practice - Inoculation of sterile broth/plates
Week 10	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Microbiology	Yes
Recommended Texts	no	Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail	**FX** – Fail	راسب (قيد	(45-	More work required but credit

Group (0 – 49)		(المعالجة	49)	awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسي

Module Information معلومات المادة الدراسية					
Module Title	**Scientific Research Methodology**			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOB309**				
ECTS Credits	2				
SWL (hr/sem)	**50**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Esam Hamid Hameed Hummadi			Email: esam_hummadi@uodiyala.edu.iq	
Module Leader's Acad. Title	**Professor**		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name					
Review Committee Approval	6/8/2025		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	• Preparing the student to the basic principles of the scientific method and to be able to locate information necessary to conduct research. • Teaching the student to be capable of critically reviewing research. • Give a knowledge to write a good scientific paper and reports and to present findings to colleagues. Also understand the ethics.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student will acquire knowledge of the basic principles of the scientific method. 2. The student will be able to locate information necessary to conduct research, to use computerized databases, and be familiar with psychology web-based resources. 3. The student will be capable of critically reviewing research reports and to synthesize a body of literature. 4. The student will be able to develop testable hypotheses. 5. The student will be knowledgeable of general research designs, experimental methods, and good research practices. They will be able to select appropriate experimental designs to test hypotheses. 6. The student will understand the ethical treatment of human and animal participants in research and will be knowledgeable of the institutional requirements for conducting research. 7. The student will be able to conduct simple statistical analyses of data and to interpret the results of the analyses. 8. The student will be able to draw conclusions from the research and to assess the generalizability of study results. 9. The student will be able to write research reports and to present findings to colleagues.		
Indicative Contents **المحتويات الإرشادية**	Quantitative research is about the collection and analysis of numerical data. It typically involves the collection of data through methods like surveys. Researchers analyze that data through various methods of mathematical and statistical analysis. Quantitative research is done in a wide range of fields, such as economics, marketing, public health, and psychology, and includes methods like the following		
Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**			
Strategies	**The main strategy that will be adopted in delivering this module is to encourage students' participation in the discussions, dialogues and group work lectures & exercises, while at the same time refining and**		

	expanding their critical thinking skills. There are many teaching and learning methods used, and the most important of these methods are: Theoretical lecture, discussion and dialogue, panel discussions on certain topics, theoretical student research **Library and electronic activities (which helps students to reach the following results:** **1- The scientific ability to distinguish between correct information and wrong information.** **2- Ease of scientific drafting and ease of correction.** **3. Ability to memorize and guess.** **4- The ability to link concepts and principles with reality.** **5. Ability to invoke, link, interpret.**

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	28	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	25		

Module Evaluation تقييم المادة الدراسية					
		Time /Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Attending lectures	1	10%(10)	all	continue
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري مادة منهجية البحث	
	Material Covered **Research Methodology**
Week 1	1. **Research Methodology**: (a) A review of the Fundamentals (b) Definitions of Research **(c)** Objectives of Research
Week 2	(a) Motivation in Research (b) General Characteristics of Research **(c)** Types of Research
Week 3	**2. The Research Problem** (a) What is a Research Problem **(b)** Selecting the Problem
Week 4	(a) Sources of the Problem (b) Statement of a Problem **(c)** Evaluation of a Problem
Week 5	**3. The Review of Literature** (a) Meaning of Review of Literature **(b)** Objectives of Review of Literature
Week 6	(a) Sources of Literature **(b)** Reporting the Review of Literature
Week 7	**4. The Research Approach** (a) The Qualitative Approach **(b)** The Quantitative Approach
Week 8	(a) The Mixed-Methods Approach **(b)** Criteria for Selecting a Research Approach
Week 9	**5. Data Collection Methods** (a) Questionnaires **(b)** Interviews
Week 10	(a) Focus Groups **(b)** Observation
Week 11	**1. Sampling** **(a)** Meaning and Definition of Sampling
Week 12	(a) Functions of Population and Sampling **(b)** Methods of Sampling
Week 13	**1. Preparation of the Research** **(a)** Characteristics of a Good Research Title

Week 14	(b) Structure of research paper: (1) Abstract (2) Introductions (3) Review of the literature (4) Methodology (5) Result & Discussions (6) Conclusions **(7)** References
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Research Methodology by Ashish Kumar Sharma (2020)	Yes
Recommended Texts	Scientific Research Methodology by Alejandro Drewes (2021)	Yes
Websites		

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above
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