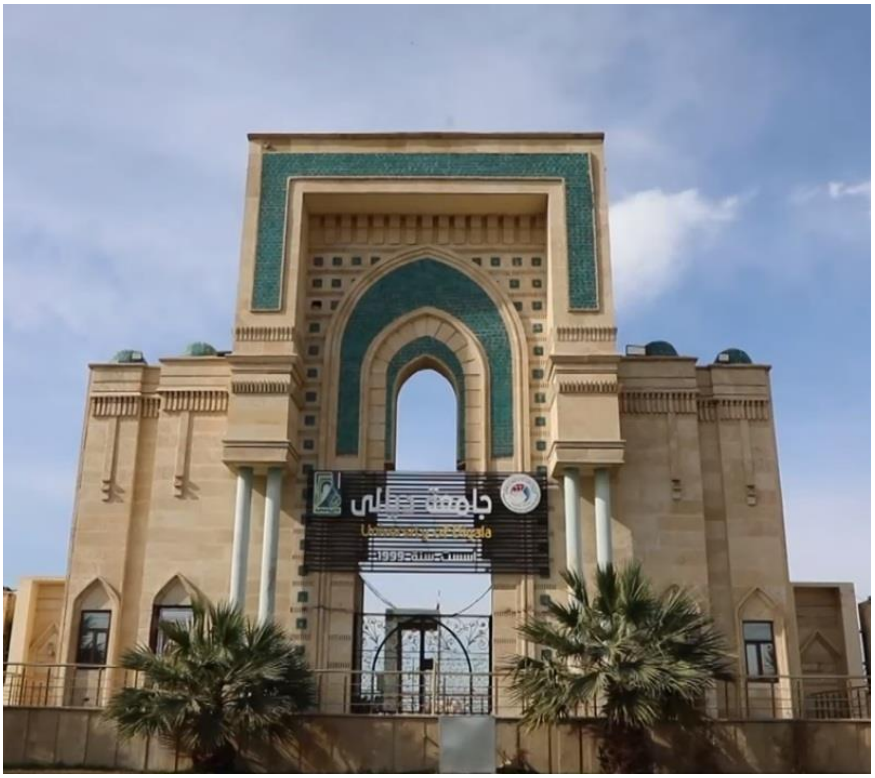
University of Diyala

First Cycle

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



نموذج وصف البرنامج الأكاديمي

اسم الجامعة: جامعة ديالى

الكلية\ المعهد: العلوم

القسم العلمي: قسم التقانة الاحيائية

اسم البرنامج الاكاديمي او المهني: البكالوريوس

اسم الشهادة النهائية: بكالوريوس في التقانة الاحيائية

النظام الدراسي: الفصلي و نظام مسار بولونيا

تاريخ اعداد الوصف: 20 \ 10 \ 2024

تاريخ ملئ الملف: 20 \ 1 \ 2025

التوقيع:

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

التاريخ: 2025-01-20

التوقيع:

اسم المعاون العلمي: أ. د. منذر حمزة راضي

التاريخ: 2025-01-20

دقق الملف من قبل:

شعبة ضمان الجودة و الأداء الجامعي

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

التاريخ:

التوقيع:

مصادقة السيد العميد

أ.د. طه محمد حسن

Table of Contents

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:	4 Levels, 8 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

Alyaa Maan Abdalhameed| Ph.D. in Biotechnology| Professor
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Mobile No.: 07728788103

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Email: Zainabamer@uodiyala.edu.iq
Mobile No.: 07700414402

Alhan Mohammed Alwan | Ph.D. in Biology | Assistant Professor
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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 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.				

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	2	B	
UD12	Arabic Language	33	17	2	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	

8. Content

Program Manager:

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Program Coordinator:

Shaymaa Hatem Al-Majmaie | Ph.D. in Medicinal Plants | Assistant Professor
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Mobile No.: 07728788103

University of Diyala
College of Science
Department of Biotechnology

MODULES DESCRIPTION FORM
FIRST CYCLE
LEVEL ONE

2024/2025

Semester ONE

MODULE DESCRIPTION FORM

Module Information

Module Title	**Principle of Biotechnology 1**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIT-1201**		
ECTS Credits	**8**		
SWL (hr/sem)	**200**		
Module Level	1	**Semester of Delivery**	1
Administering Department	Biotechnology	**College**	College of Science
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	Ahmed Kareem Alatafi	**e-mail**	ahmedkareemalatafi@uodiyala.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

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	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	

Learning and Teaching Strategies

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)

Student Workload (SWL)

Structured SWL (h/sem)	109	**Structured SWL (h/w)**	7.26
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6.06
Total SWL (h/sem)	200		

Module Evaluation

		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)

	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)

	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

	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				
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
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MODULE DESCRIPTION FORM

Module Information

Module Title	**General Biology 1**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIT-1101**		
ECTS Credits	**8**		
SWL (hr/sem)	**200**		

Module Level	1	**Semester of Delivery**	1
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Shaymaa Hatem Al-Majmaie	**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	1/06/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

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Module Aims	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	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	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

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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Structured SWL (h/sem)	109	**Structured SWL (h/w)**	7.26
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6.06
Total SWL (h/sem)	200		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 3, 5 , 8 and 12
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	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	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 11	**Mineral Nutrition of the Plant**
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)

	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

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

Module Information

Module Title	**Analytical chemistry**	**Module Delivery**	
Module Type	**Support**	☒ **Theory** ☐**Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**BIT-1102**		
ECTS Credits	**7**		
SWL (hr/Sem)	**175**		

Module Level	1 1	**Semester of Delivery**	1
Administering Department	Chemistry department	**College**	College of Science
Module Leader	Ebtehal Sabri Mohammed	**e-mail**	dr.ebtehal@uodiyala.edu.iq
Module Leader's Acad. Title	Assistance Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Mohamed Jabar Mohamed	**e-mail**	**mohammedjabbar0908@gmail.com**
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	0.1

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	**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	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	
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)

Structured SWL (h/sem)	94	**Structured SWL (h/w)**	6.26
Unstructured SWL (h/sem)	81	**Unstructured SWL (h/w)**	5.4
Total SWL (h/sem)	**175**		

Module Evaluation					
		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 #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)	
	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)	
	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) HCL
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		
	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				
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

Module Information

Module Title	**Computer Skills**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**UD13**		
ECTS Credits	**3**		
SWL (hr/sem)	**75**		
Module Level	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. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
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

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	• 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	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	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

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)

Structured SWL (h/sem)	49	**Structured SWL (h/w)**	3.26
Unstructured SWL (h/sem)	26	**Unstructured SWL (h/w)**	1.73
Total SWL (h/sem)	75		

Module Evaluation

		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)

	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

	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

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
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MODULE DESCRIPTION FORM

Module Information

Module Title	**Human Right and Democracy**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UD14**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	1	**Semester of Delivery**	1
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Kamal sabbar Breseem	**e-mail**	kamalsabbar@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant Lecture	**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

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	**Cognitive goals.**

Outcomes	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	• 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

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)

Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2.2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1.13
Total SWL (h/sem)	50		

Module Evaluation

		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)

	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 qualities, Types of human rights 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 of Hammurabi.
Week 3	Human rights in other ancient civilizations: 1- Indian and Chinese civilization 2- Pharaonic civilization of Egypt 3- Greek civilization 4- Roman 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 human rights, 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): Liberal Democracy (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 human rights, 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 election Second: Legal adaptation of the Election, Third: Conditions of Election, Fourth: Concepts of Elections, Fifth: Types of Electoral Systems. Assessing the Democratic System, Pros and advantages of the democratic system, Disadvantages and disadvantages of the democratic system, Implementing the democratic system in Iraq.
Week 14	Lobbyists: First: the concept and definition. Second: Types of pressure groups. Third: Themethods of pressure groups that they use to achieve their goals.

	Fourth: Lobbying and Democracy.
Week 15	Final Exam

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Martyrdom verses from the Holy Quran Mohammed Al-Tarawneh et al., International HumanitarianLaw, ICRC, Amman, 2005 Diamond Larry, Democracy: Its Development and Ways toEnhance 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 Nationshttps://sc.uobaghdad.edu.iq/?page_id=8415 https://www.youtube.com/@ansamalobidimanagerofhuman2891	

Grading Scheme

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

Module Information

Module Title	**اللغة العربية**	**Module Delivery**

Module Type	**Basic**		**Theory** **Lecture** Lab Tutorial Practical **Seminar**
Module Code	**UD12**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	1	**Semester of Delivery**	1
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	01/06/2023	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	**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	**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	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

Strategies	- **المحاضرة والمشاركة.** - **المناقشة والحوار.** - **العصف الذهني.** - **كتابة التقارير عن الموضوع.** - **السؤال والجواب .**

Student Workload (SWL)

Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2.2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1.13

Total SWL (h/sem)	50		

Module Evaluation

		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)

	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	دب، 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	دب، 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 رفة 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)

Learning and Teaching Resources

	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

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

Module Information		
Module Title	**Principle of Biotechnology 2**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab**
Module Code	**BIOT-1207**	

ECTS Credits	**8**	☐ Tutorial ☐ Practical ☒ Seminar	
SWL (hr/sem)	**200**		

Module Level	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		**Module Leader's Qualification**	Ph.D.
Module Tutor	Ahmed Kareem Alatafi	e-mail	ahmedkareemalatafi@uodiyala.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	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

Strategies	Teaching students the basic foundations and principles of biotechnology related to the various 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)

Structured SWL (h/sem)	109	**Structured SWL (h/w)**	7.26
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6.06
Total SWL (h/sem)	200		

Module Evaluation

		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)

	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)

	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

	Text	**Available in the Library?**
Required Texts	1- Microbiology and Biotechnology (2001) 2- A Text book of Biotechnology(2006)	Yes
Recommended Texts	1-Methods in Biotechnology (1997) 2- Biotechnology, Principles and Application (1988)	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

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

Module Information		
Module Title	**General Biology 2**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	**BIOT-1208**	
ECTS Credits	**8**	
SWL (hr/sem)	**200**	

Module Level	1	**Semester of Delivery**	2
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Annam Fuad	**e-mail**	anaamfuad@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	01/06/2024	**Version Number**	1.0

Relation with other Modules

Prerequisite module	General Biology 1	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	1. This course deals with the basic concept of Zoology. 2. To understand the role of Zoology in the Biotechnology field.
Module Learning Outcomes	**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	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

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)

Structured SWL (h/sem)	109	**Structured SWL (h/w)**	7.26
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6.06
Total SWL (h/sem)	200		

Module Evaluation

		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)

	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 14	Animal model: drug pharmacological, disease resistance models, mutation induced models, stress

	induced model
Week 15	Final exam

Delivery Plan (Weekly Lab. Syllabus)

	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

	Text	**Available in the Library?**
Required Texts	1- M. Koto-The. Biology of biodiversity-Springer 2- E.O. Wilson-Biodiversity-Academic Press Washington. 3- G.G.-Simpson-Principle of animal taxonomy 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

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

Module Information		
Module Title	**Organic chemistry**	**Module Delivery**
Module Type	**Support**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ Tutorial
Module Code	**BIOT-1209**	

ECTS Credits	**5**	☐ Practical ☐ Seminar	
SWL (hr/Sem)	**125**		

Module Level	1 1	**Semester of Delivery**	2
Administering Department	Chemistry	**College**	College of Science
Module Leader	Ebtehal Sabri Mohammed	**e-mail**	dr.ebtehal@uodiyala.edu.iq
Module Leader's Acad. Title	Assistance Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Mohamed Jabar Mohamed	**e-mail**	mohammedjabbar0908@gmail.com
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	**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	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	
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)			
Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.06
Total SWL (h/sem)	125		

Module Evaluation					
		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 #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)	
	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)	
	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		
	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

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

Module Information

Module Title	**Biophysics**	**Module Delivery**	
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**03B**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	1	**Semester of Delivery**	2
Administering Department	Physics Department	**College**	College of Science
Module Leader	Raghd Talal	**e-mail**	raghadtalal@uodiyala.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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. 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	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

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.06
Total SWL (h/sem)	125		

Module Evaluation

		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)

	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	Equilibrium of a particle: Understanding of forces, Newton's first law, Newton's second law, 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 13	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 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)

	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

	Text	**Available in the Library?**
Required Texts	Fundamental of Physics (Halliady, Resnick, and Walker).	Yes
Recommended Texts		
Websites		

Grading Scheme

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

Module Information

Module Title	Biostatistics		
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIT-1204**		
ECTS Credits	**3**		
SWL (hr/sem)	**75**		

Module Level	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	01/06/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	**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	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	Improving the student's ability to observe To learn how to imitate and imitate: Imitationto learn the method of experimentation

Learning and Teaching Strategies

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

Student Workload (SWL)

Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3.2
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	1.8
Total SWL (h/sem)	75		

Module Evaluation

		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)

	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

	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) ، (2) ، الموصل جامعة " العشوائية والمتغيرات الاحتمالية " ذنون يونس باسل	NO

	1985 (3) ، الموصل جامعة "الإحصاء إلى المدخل " الراوي محمود خاشع 1979 (حميد احمد ترجمة " الصحية للعلوم الحياتي الإحصاء مقدمة " دي . روبرت) 4 بغداد جامعة ، وآخرون الخياط 1989 (جامعة " الإحصاء مبادى " سيفي صادق محمد وعلي الغرابي إسماعيل سليم) 5 بغداد 1985 ( ) ، البصرة جامعة " الرياضي الإحصاء في مقدمة " سليم داود صباح 1989 6 (7) ، الموصل جامعة " الإحصاء " الصفاوي يونس صفاء 2008 (بلغة كمبيوتر برامج مع الوصفي الإحصاء " الملا خالد و شربجي الرزاق عبد) 8 للملايين العلم دار " بيسك بيروت 1987 ، بغداد جامعة " الإحصاء " هرمز حنا وأمير المشهداني، حسن محمود 1985 (9) (10) جامعة " الإحصائية والطرق الإحصاء أصول " المشهداني حسن محمود ، بغداد 1985 (علي الرحيم عبد احمد ترجمة ،"الحياتية للعلوم الإحصاء" شيفلر، .س وليام) 11 خطار، منسي الدين وسيف البصرة، جامعة 1984	
Websites	https://www.syriamath.net/library	

Grading Scheme				
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

Module Information

Module Title	**English Language**	**Module Delivery**	
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UD11**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	1	**Semester of Delivery**	2
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Shaymaa Hatam Abdullah	**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	01/06/2023	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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: • 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	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

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)

Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2.2

Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1.13
Total SWL (h/sem)	50		

Module Evaluation

		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)

	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

	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 with each 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

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.

Curriculum/Modules

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT-2313	**Microbiology 1**	79	46	5	C	
BIOT-2314	**Environmental biotechnology**	79	21	4	C	
BIOT-2315	**Nanobiotechnology**	79	46	5	C	
BIOT-2316	**Biochemistry 1**	79	46	5	C	
BIOT-2317	**Animal Physiology**	79	21	4	C	
BIOT-2318	**Biosafety and Biosecurity**	48	27	3	S	
UD24	**Baathist Crimes in Iraq**	33	17	2	S	
UD21	**English Language 2**	33	17	2	B	UN-1205

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name	SSWL	USSWL	ECTS	Module Type	Prerequisite Module(s) Code
BIOT-2419	**Microbiology 2**	79	71	6	C	BIOT-2313
BIOT-2420	**Biological Control**	79	96	7		
BIOT-2421	**Biochemistry 2**	79	71	6	S	BIT-2316
BIOT-2422	**Histological and Microscopic Preparations**	79	71	6	S	
UD23	**Computer Sckill 2**	26	26	3	B	UD03
UD22	**Arabic Language 2**	17	17	2	S	UD02

8. Content

Program Manager:

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University of Diyala
College of Science
Department of Biotechnology

MODULES DESCRIPTION FORM
FIRST CYCLE
LEVEL TWO
2024/2025

Semester Three

MODULE DESCRIPTION FORM

Module Information

Module Title	**Microbiology I**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-2313**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	3
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Zainab Amer	**e-mail**	Zainabamer@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant professor	**Module Leader's Qualification**	**M.Sc.**
Module Tutor	Hiba Hilal Hadeel Areibi	**e-mail**	Hiba.a@uodiyala.edu.iq Hadeel.a@uodiyala.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0

Relation with other Modules

Prerequisite module	Pathogenic bacteria, mycology, immunology and virology.	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	**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	
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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	71	**Unstructured SWL (h/w)**	4.73
Total SWL (h/sem)	150		

Module Evaluation

		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)

	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)

	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

	Text	**Available in the Library?**
Required Texts	1. Jawetz, Melnick and Adellberg's. (2011). Textbook of Medical Microbiology.26th Edition.	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

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

Module Information

Module Title	**Environmental Microbiology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-2314**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	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	1/06/2024	**Version Number**	1.0

Relation with other Modules

Prerequisite module	Microbiology	**Semester**	5.26
Co-requisites module	Environmental Biotechnology	**Semester**	4.73

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	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

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.25
Unstructured SWL (h/sem)	71	**Unstructured SWL (h/w)**	4.73
Total SWL (h/sem)	150		

Module Evaluation

		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
ںSummative 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)

	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 10	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,
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)

	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

	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

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

Module Information

Module Title	**Nanobiotechnology**	**Module Delivery**	
Module Type	**CORE**	☒**Theory** ☒ **Lecture** ☒**Lab** ☐ Tutorial ☐ Practical ☒ Semina**r**	
Module Code	**BIOT-2315**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	3
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

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	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

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

Student Workload (SWL)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	71	**Unstructured SWL (h/w)**	4.73
Total SWL (h/sem)	150		

Module Evaluation

		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)

	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 11	Nanopharmaceuticals and Nanomedical Device
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)

	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

		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

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

Module Information

Module Title	**Biochemistry1**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-2316**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	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	Assistant professor	**Module Leader's Qualification**	Ph.D
Module Tutor	Assel Faiq	**e-mail**	aseelaa084@gmail.com
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	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

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.06
Total SWL (h/sem)	125		

Module Evaluation

		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)

	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 16	**final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	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

	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

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

Module Information

Module Title	**Animal physiology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-2317**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	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	01/06/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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 • 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

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.06

Total SWL (h/sem)	125

Module Evaluation

		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)

	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)

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

	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				
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

Module Information

Module Title	Biosafety and Biosecurity	**Module Delivery**	
Module Type	Support	☒ **Theory** ☒ **Lecture** ☐**Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	BIOT-2318		
ECTS Credits	2		
SWL (hr/Sem)	50		
Module Level	1 2	**Semester of Delivery**	3
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Shaymaa Al-Majmaie	**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	01/06/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	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	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	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

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)

Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2.2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1.13
Total SWL (h/sem)	50		

Module Evaluation

		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 #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)

	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

	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

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
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Fail Group (0 – 49)	FX - Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
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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 FOUR

MODULE DESCRIPTION FORM

Module Information

Module Title	**Microbiology 2**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-2419**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	4
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Zainab Amer	**e-mail**	Zainabamer@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant professor	**Module Leader's Qualification**	M.Sc.
Module Tutor	Hiba Ali	**e-mail**	Hiba.a@uodiyala.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0

Relation with other Modules

Prerequisite module	Microbiology 1	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	**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

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	71	**Unstructured SWL (h/w)**	4.73

Total SWL (h/sem)	150

Module Evaluation

		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)

	Material Covered
Week 1	Host defenses
Week 2	Adaptive, Specific Immunity and Immunization
Week 3	Introduction to parasitology Intestinal protozoa Entamoeba histolytica:
Week 4	Urogenital, Blood and tissue protozoa Trichomonas vaginalis Plasmodium spp.
Week 5	Blood and tissue protozoa Toxoplasma gondii
Week 6	Blood and tissue protozoa: Trypanosoma spp.
Week 7	Mid-term Exam.
Week 8	Blood and tissue protozoa: Leishmania spp.
Week 9	Helminthes: Trematodes
Week 10	Helminthes: Cestodes
Week 11	Helminthes : Nematodes
Week 12	Introduction into virology and the classification of viruses and mode of infection and transmmoion
Week 13	Anatomical structure of the virus and their types associated with human health

Week 14	mycology / introduction – fungi growth nutrition and reproduction
Week 15	Fungi infections and their causative agents .
Week 16	Algae / introduction classification growth and nutrition.

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Instructions for the lab. work and learn how to make the blood smear.
Week 2	Detection and counting method of the WBC
Week 3	Laboratory diagnosis methods of parasitic protozoa and helminthes
Week 4	Kingdom: Protista or Animalia Subkingdom: Protozoa Phylum: Sarcomastigophora Subphylum: Sarcodina Class: Lobosea Order: Amoebida Species : Entamoeba histolytica ; Entamoeba coli ; Entamoeba gingivalis ; Iodamoeba butschlii
Week 5	Kingdom: Protista or Animalia Sub kingdom : Protozoa Phylum : Ciliophora Class : Ciliata Sub class : Holotrichia Order : Spirotricha Genus : Balantidium coli
Week 6	Examination.
Week 7	Kingdom: Protista or Animalia Subkingdom: Protozoa Phylum: Sarcomastigophora Subphylum :Mastigophora Class : Zoomastigophora Order :Diplomonadina Genus :Giardia lamblia ;Trichomonas vaginalis
Week 8	Phylum: Apicoplexa Class : sporozoa Subclass : coccidia Order : Haemosporidia Genus : Plasmodium Species : Plasmodium vivax :- tertian or benign tertian malaria Plasmodium falciparum :- malignant tertian or sub tertian malaria Plasmodium malariae :- Quartan malariaPlasmodium ovale :- tertian malaria
Week 9	Phylum: Apicoplexa

	Class : sporozoa Subclass : coccidia Order : Eucoccidiida Sub order : Eimerina Genus : Toxoplasma Species : Toxoplasma gondii
Week 10	Phylum: Sarcomastigophora Subphylum :Mastigophora Class : Zoomastigophora Order : Protomonadina 1. Genu s : Leishmania Specie : Leishmania donovani Leishmania tropica ; Leishmania braziliensis 2:Genus :Trypanosoma Specie : - Trypanosoma gambiense ; Trypanosoma rhodesiense ; Trypanosoma cruzi
Week 11	Kingdom : Animalia Sub kingdom :Metozoa Phylum :Platyheminthes Class : Trematoda Subclass : Digenea
Week 12	Kingdom : Animalia Sub kingdom :Metozoa Phylum :Platyheminthes Class : Cestoda Subclass : Eucestoda Order: Cyclophyllidea
Week 13	Kingdom : Animalia Subkingdom : Metozoa Phylum : Aschehelminthes Class : Nematoda 1.Subclass : Aphasmidia Order : Trichuroidea Species :Trichuris trichiura 2. Subclass : Phasmidia Order : Oxyurida Species : Enterobius vermicular Order : Ascaridida Species :Ascaris lumbricoides

Learning and Teaching Resources

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

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

Grading Scheme				
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

Module Information

Module Title	**Biological Control**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-2420**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	2	**Semester of Delivery**	4
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Shaymaa Al-majmaie	**e-mail**	shaymaa@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant professor	**Module Leader's Qualification**	M.Sc.
Module Tutor	Maryam Abdulsalam	**e-mail**	Mariamabdul_salam@uodiyala.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	Indicative content includes the following. Part A – General concepts 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] Part B -The Insecticides Microbial Insecticides- Microbial Insecticides (Advantages and Disadvantages), Bacterial insecticide, Fungi as Agents of Biocontrol. [18 hrs] Part C - Biological Control of Pathogens Biological Control of Plant Pathogens- Biological control of Nematodes, Biological control of filamentous Algae, Biological control of weeds. [22 hrs]

Learning and Teaching Strategies

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	71	**Unstructured SWL (h/w)**	4.73
Total SWL (h/sem)	150		

Module Evaluation

		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)

	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)

	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

	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

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

Module Information

Module Title	**Biochemistry2**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**BIOT-2422**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	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 Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0

Relation with other Modules

Prerequisite module	Biochemistry1	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	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	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	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

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.06
Total SWL (h/sem)	125		

Module Evaluation

		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)

	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)

	Material Covered
Week 1	Lab 1: Blood-Types and serum, plasma
Week 2	Lab 2: General urine examination
Week 3	Lab 3: lBlood glucose
Week 4	Lab 4: Iipid 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

	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

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

Module Information

Module Title	**Histology and Microtechnique**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ Tutorial ☐ Practical √ Seminar	
Module Code	**BIOT-2422**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	2	**Semester of Delivery**	4
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Riyadh Hameed Nsaif	**e-mail**	riyadhhameed@uodiyala.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Massar Hadi	**e-mail**	Masarhadi@uodiyala.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

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. 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	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	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

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)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.26
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.06
Total SWL (h/sem)	125		

Module Evaluation

		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	**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)

	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)

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

	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

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

Module Information		
Module Title	The Crimes of the Baath Regime in Iraq	**Module Delivery**
Module Type	B	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial**
Module Code	UD24	

ECTS Credits	2	☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	50		

Module Level	2	**Semester of Delivery**	4
Administering Department	Biotechnology	**College**	College of Science
Module Leader	Kamal sabbar Breseem	**e-mail**	kamalsabbar@uodiyala.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	none	**e-mail**	
Scientific Committee Approval Date	11/08/2024	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	ارتكب نظام البعث في العراق إبان حكمهم عددا كبيرا من الجرائم المختلفة ، واختلافها يلزم بيان مفاهيم وتعاريف للطالب ليكون على معرفة ودراية بما يمر بها مما لها علاقة بمادة المنهاج ، كمفهوم الجريمة و أقسامها، والجرائم الدولية التي حُكِم عليها قيادات وأزلام نظام البعث وفق قانون المحكمة الجنائية العراقية العليا، و بيان مفهوم الجرائم و أقسامها، و بيان جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا لسنة ٢٠٠٥ م.
Module Learning Outcomes	1- تسليط الضوء على جرائم ارتكبها نظامٌ جائرٌ في العالمَ ك لهّ على تعاقبُ الأزَمانِ كتلكَ التي ارتكبها (نظامُ البعثِ)على صعيد العراقِ خاصة ، والمنطقةِ الإقليمية عامة ، والعالمَ كله شُمولًا. 2- لقد جثمَ نظامُ البعثِ البائدِ على صدرِ العراقِ و العراقيينَ زهاء أرَبعةِ عقودٍ يستقي سياسه تسلطُّه من رَضاع عُ تاة الطغاة حِقبَ التاريخ ك)قابيلَ ، والنمرودِ ، وفرعَونَ ، وأبَي لهبٍ ، والحجَّاج ، ويزيد ، وهولاكو ، وموسيليني ، وهتلر (بما يتناسبُ ونشأة رأسِه الطاغيةِ وعدوّ الإنسانيةِ) صدام حسين (المقبورِ ؛ فذاقَ وَيلاتِ بطشِ هذا النظامِ كلُّ مَنِ انتهجَ سبيلَ الحقّ وحُبِّ الوطنِ ؛ فرفض النهجَ البعثيَّ العفنَ ، واكتوى بنارِ قمعِه مِن صنوفِ المآسي والمِحَنِ.

	-3 لقد تحصَّلَ من هذا الواجبِ التربويّ - التعليميّ) الشرعيّ - الرسميّ(ِ أنَ تكُلفَّ َ لجَنة وزارية مختصة تعُنىَ بوضع منهج يوُثِقُّ بعضا من) جرائمَ النظامِ البعثيّ(ِ ؛ ليكونَ مَبصَرَ حقيقةٍ يشُرِفُ بهِ الشبابُ الجامعيُّ الحاليُّ على ما مضَى من حياة عقودٍ مِن حُكمِ العراقِ بيدِ طاغيةٍ شيطانٍ بهيأة إنسانٍ فيستحضرون من اطِّلاعِهم على أفَصُلِهِ ومضامينِها ما يجعلهُم على هُدىً يدرؤُون بهِ كلَّ تعَمِيةٍ إعِلاميةٍ تحُاولُ تضليلهَم ؛ فيمَنعوُن بهِ كلَّ عمًى.
Indicative Contents	ارتأتِ اللجنة - التي عاش رئيسُها وأعَضاؤُها كافة مُدة الحُكمِ البعثيّ المُجرمِ ، وذاقوُا مِن وَيلاتِ ا بصدقٍ ومصاديقَ - بعد رِحلةِ توثيقيةٍ بطشِهِ ما يجعلُ هذا المنهجَ المقررَ للمنظومةِ الأكَاديميةِ الجامعيةِ موضوعى حضوريةٍ ، وإلِكترونيةٍ أنَ يأتيَ هذا المنهجُ المُقررُ على مقدِمّةٍ هي التي بينَ يديَ الطالبِ الجام عيّ ، والقارئِ يستنيرُ بها للمضمونِ كلِهّ بدواعي تأليفِهِ ، ومسوّغاتِ إقِراره ، ودوافع تدريسِهِ ، ثم أرَبعةِ أفَصُلٍ وُظِّفَ أوَلهُا لتوثيقِ) جرائمِ نظامِ البعثِ وفقَ قانونِ المحكمةِ الجنائيةِ العراقيةِ العلُيا عام ٢٠٠٥ م (، وجُعِل ثانيها لكشفِ) الجرائمِ النفسيةِ والاجتماعيةِ ، وآثارِها ، وأبَرز انتهاكاتِ النظامِ البعثيّ في العراق (، وكُرّس ثالثهُا لتبيينِ) الجرائمِ البيئيةِ لنظامِ البعثِ في العراق (، أمَّا الفصلُ الرابعُ والأخَيرُ فقد خُصِّص ل)جرائمِ المقابرِ الجماعيةِ (،ثم خُتِم المنهجُ بملخَّصٍ شافٍ وافٍ يضَعُ الحقائقَ مواضعهَا مما مرَّ العرضُ لهِ ، والاستدلالُ عليهِ. لقد تضمن هذا المنهجُ ما جاء مفاتيحَ معرفية بيدِ الطالبِ الجامعيّ يقَوَى بها على كلِّ مُرتجَ حَبكَ َت رواية أكُذوبتهِ أيَادي البعثِ وإعلامُه المزيفِّ ، وباعت ضميرَها أنَفسُ ٌ ترى أنَ تبقى إلِى الآنَ ذليلة أسَيرة ، وذيَلًا تابعاً.

Learning and Teaching Strategies	
Strategies	هذا الواجبِ التربويّ - التعليميّ) الشرعيّ - الرسميّ(ِ أنَ تكُلفَّ َ لجَنة وزارية مختصة تعُنىَ بوضع منهج يوُثِقُّ بعضا من) جرائمَ النظامِ البعثيّ(ِ ؛ ليكونَ مَبصَرَ حقيقةٍ يشُرِفُ بهِ الشبابُ الجامعيُّ الحاليُّ على ما مضَى من حياة عقودٍ مِن حُكمِ العراقِ بيدِ طاغيةٍ شيطانٍ بهيأة إنسانٍ ؛ فيستحضرون من اطِّلاعِهم على أفَصُلِهِ ومضامينِها ما يجعلهُم على هُدىً يدرؤُون بهِ كلَّ تعَمِيةٍ إعِلاميةٍ تحُاولُ تضليلهَم ؛ فيمَنعوُن بهِ كلَّ عمًى.

Student Workload (SWL)			
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

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	المقدمة /جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا عام ٢٠٠٥ م
Week 2	الفصل الأوَل: ١,١ . مفهوم الجرائم و أقسامها ١,١,١ . تعريف الجريمة لغة واصطلاحا
Week 3	.أقسام الجرائم ١,٢. جرائم نظام البعث وفق توثيق قانون المحكمة الجنائية العراقية العليا عام ٢٠٠5 ١,٢,١. أنواع الجرائم الدولية
Week 4	.القرارات الصادرة من المحكمة الجنائية العليا
Week 5	الفصل الثاني الجرائم النفسية والاجتماعية وأثارها، وأبرز انتهاكات النظام البعثي في العراق
Week 6	.الجرائم النفسية ٢,١,١ . آليات الجرائم النفسية.

	٢,١,٢ آثار الجرائم النفسية. ٢,٢ الجرائم الاجتماعية. ٢,٢,١ عسكرة المجتمع
Week 7	. موقف النظام البعثي من الدين انتهاكات القوانين العراقية ٢,٣,١ . صور انتهاكات حقوق الإنسان وجرائم السلطة
Week 8	.بعض قرارات الانتهاكات السياسية والعسكرية لنظام البعث ٢,٣,٣ . أماكن السجون والاحتجاز لنظام البعث
Week 9	الفصل الثالث الجرائم البيئية لنظام البعث في العراق.
Week 10	٣,١ . التلوث الحربي والإشعاعي وانفجار الالغام
Week 11	٢ . تدمير المدن والقرى(سياسة الأرض المحروقة)
Week 12	.تجفيف الأهوار ٣,٤ . تجريف بساتين النخيل والأشجار والمزروعات
Week 13	جرائم المقابر الجماعية
Week 14	جرائم المقابر الجماعية أحداث مقابر الإبادة الجماعيةّ المرتكبة من النظام البعثي في العرا ق
Week 15	**EXAM**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	جرائم حزب البعث في العراق النسخة 1 – الطبعة الاولى20023	yes
Recommended Texts	أرشيف مؤسسة السجناء السياسيين. أرشيف مؤسسة الشهداء. -أرشيف المركز العراقي لتوثيق جرائم التطرف في العتبة العباسية المقدسة.	No

	-الموقع الرسمي للأمم المتحدة. -ايمن عبد العزيز سلامة ، ال مسؤولية الدولية عن ارتكاب جريمة الابادة الجماعية ، ط ١، دار العلوم للنشر والتوزيع ، القاهرة ، ٢٠٠٦. -جندي عبد الملك، الموسوعة الجنائية، الجزء الثالث، دار احياء التراث العربي، بيروت، ١٩٩٠ م.	
Websites	https://iraqicenter-fdec.org/archives/4224	

Grading Scheme

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Academic Program and Course Description Guide

2024-2025

Introduction

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

Concepts and Terminology

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

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

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

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

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

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

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

نموذج وصف البرنامج الأكاديمي

اسم الجامعة: جامعة ديالى

الكلية\ المعهد: العلوم

القسم العلمي: قسم التقانة الاحيائية

اسم البرنامج الاكاديمي او المهني: البكالوريوس

اسم الشهادة النهائية: بكالوريوس في التقانة الاحيائية

النظام الدراسي: الفصلي و نظام مسار بولونيا

تاريخ اعداد الوصف: 20 \ 10 \ 2024

تاريخ ملئ الملف: 20 \ 1 \ 2025

التوقيع:

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

التاريخ: 2025-01-20

التوقيع:

اسم المعاون العلمي: أ. د. منذر حمزة راضي

التاريخ: 2025-01-20

دقق الملف من قبل:

شعبة ضمان الجودة و الأداء الجامعي

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

التاريخ:

التوقيع:

مصادقة السيد العميد

أ.د. طه محمد حسن

1. Program Vision

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

2. Program Mission

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

3. Program Objectives

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

4. program accreditation

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

5. Other external influences
No

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

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

7. Program Description

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

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

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

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

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

Professional development

Orienting new faculty members

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

Professional development of faculty members

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

12. Acceptance Criterion

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

13. The most important sources of information about the program

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

14. Program Development Plan

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

Program Skills Outline

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

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

THIRD LEVEL

Course Description Form

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

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

10. Course Structure

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

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

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

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

Course Description Form

1. Course Name:	**Food microbiology**
2. Course Code:	
BT301	
3. Semester/Year:2024-2025	
Semester second	
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
60	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Zainab amer hatem Email: zainabamer@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	1- developing an understanding of how microorganisms impact food safety and quality, learning to identify pathogenic, spoilage, and beneficial microbes, and mastering methods for food preservation, spoilage control, and foodborne disease prevention. **2-** Students also aim to understand the factors affecting microbial growth in food, apply this knowledge to practical industry problems, and learn to use both beneficial and harmful microorganisms in food production and fermentation processes
9. Teaching and Learning Strategies	
Strategy	1- combine traditional methods like lectures and practical labs with engaging activities such as agar art, case studies of foodborne illness, and research projects **2-** Active learning, problem-solving, group discussions, and incorporating technology like inverted classrooms can enhance understanding of microbiology and safety principles, moving beyond passive learning to promote deeper engagement and critical thinking in students

10. Course Structure

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

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

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

11. Course Evaluation	
• Midterm Examination Tests understanding of fundamental concepts and principles of food microbiology . • Laboratory Work / Practical Reports Assessment of hands-on skills, safety practices, and data interpretation. • Assignments / Case Studies / Presentations Evaluates critical thinking, application of food microbiology to real-world problems, and communication skills. • Quizzes / Continuous Assessment Short tests to encourage consistent learning throughout the course. • Final Examination	
12. Learning and Teaching Resources	
Required Textbooks (curricular books, if any)	Food Microbiology. Fundamentals and Frontiers. M.P. Doyle, L.R. Beuchat and T.J. Montville, eds., ASM Press, Washington, DC. 1997 (or 2001).
Main References (sources)	Modern Food Microbiology. Seventh Edition. J.M. Jay. Aspen Publishers, Inc., Gaithersburg, Maryland 2005. .3 Food Microbiology: An Introduction. T.J. Montville and K.R. Matthews (any edition) ASM Press, Washington, DC.2005
Recommended Books and References (scientific journals, reports ... etc.)	journal of food safety .2 journal of food protection .3 journal of food science
Electronic References (websites … etc.)	

Course Description Form

1. Course Name: **Animal Tissue Culture**
2. Course Code:
BT409
3. Semester / Year:
Semester
4. Description Preparation Date:
22 / 4/ 2024
5. Available Attendance Forms:
Mandatory Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
3 units (60 study hours)
7. Course administrator's name (mention all, if more than one name)
Name: Assistance lecture Massar Hadi Ismail Email: Masarhadi@uodiyala.edu.iq
8. Course Objectives

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

1. Course Structure

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

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

2. Course Evaluation

3. Learning and Teaching Resources

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

Course Description Form

1. Course Name:

Mycology

2. Course Code:

BT300

3. Semester / Year:

Semester

4. Description Preparation Date:

22 / 4/ 2024

5. Available Attendance Forms:

Mandatory Attendance

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

3 units (60 study hours)

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

Name: Najwan Kaleil Ibrahim | Ph.D. in Biology | Lecturer
Email: Najwanabbas@uodiyala.edu.iq

8. Course Objectives

Course Objectives	➢ Introduce students to fungi, their increasing importance, their characteristics, methods of identification, preservation, and classification. ➢ Explain the role of fungi and yeasts in the decomposition of organic and mineral materials, forming active organisms that participate in ecological balance and serve as the second most widespread living group after bacteria. ➢ Familiarize students with the clinical classification of fungi, diagnostic methods, and chemical/microscopic techniques used in fungal studies. ➢ Introduce students to pathogenic fungi, methods of treatment, and beneficial fungi used in industry and biological processes.

This course provides a proposed framework to clarify the objectives of the subject and the expected learning outcomes for students, ensuring that they benefit from the available educational opportunities. It is also necessary to establish a link between the description and the learning outcomes.

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

9. Course Structure

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

First	(2T+2P)		**Definition of Mycology**	PowerPoint+ Kits and Lab. materials	Daily Exams
Second	(2T+2P)		Morphology of Fungi – **Molds and yeasts.**	PowerPoint+ Kits and Lab. materials	Daily Exams
Third	(2T+2P)		**Fungal Cell Structure and Function**	PowerPoint+ Kits and Lab. materials	Daily Exams
Four	(2T+2P)		**Reproduction of Fungi**	PowerPoint+ Kits and Lab. materials	Daily Exams
Five	(2T+2P)	Exam.	Exam.	PowerPoint	
Six	(2T+2P)		Taxonomy of Fungi – **Kingdom 1: Protozoa**	PowerPoint+ Kits and Lab. materials	Daily Exams
Seven	(2T+2P)		Kingdom 2: Straminipila –	PowerPoint+ Kits and Lab. materials	Daily Exams
Eight	(2T+2P)		Kingdom 3: Fungi – **Phylum 1: Chytridiomycota, Phylum 2: Zygomycota**	PowerPoint+ Kits and Lab. materials	Daily Exams
Nine	(2T+2P)		Phylum 3: Ascomycota – **Classes: Archiascomycetes, Hemiascomycetes**	PowerPoint+ Kits and Lab. materials	Daily Exams
Ten	(2T+2P)		Phylum 3 (continued): Ascomycota – **Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes**	PowerPoint+ Kits and Lab. materials	Daily Exams
Eleven	(2T+2P)		Phylum 3 (continued): Ascomycota – **Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes**	PowerPoint+ Kits and Lab. materials	Daily Exams
Twelve	(2T+2P)		Phylum 4: Basidiomycota **– Phylum 5: Anamorphic fungi**	PowerPoint+ Kits and Lab. materials	Daily Exams
Thirteen	(2T+2P)		**Phylum 4: Basidiomycota** – Phylum 5: Anamorphic fungi	PowerPoint+ Kits and Lab. materials	Daily Exams
Fourteen	(2T+2P)		Phylum 4: Basidiomycota **– Phylum 5: Anamorphic fungi**	PowerPoint+ Kits and Lab. materials	Daily Exams
Fifteen	(2T+2P)	Exam.	Exam.	PowerPoint	
10. Course Evaluation					

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

11. Learning and Teaching Resources

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

Course Description Form

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

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

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

10. Course Structure

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

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

11. Course Evaluation

12. Learning and Teaching Resources

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

Course Description Form

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

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

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

10. Course Structure

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Antibiotics
2. Course Code:
BT304
3. Semester/Year: Second semester 2024-2025
Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
4 weekly (2 hours theoretical part _ 2 hours practical part) + 3 units
7. Course Administrator's Name (mention all, if more than one name)
Name: Zainab Amer Hatem Email: zainab amer@uodiyala.edu.iq

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

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

10. Course Structure

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

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:

Experimental Design

2. Course Code:

BT309

3. Semester/Year:

Third Semester

4. Description Preparation Date:

1/9/2024

5. Available Attendance Forms:

weekly

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

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

Name: Professor Dr. Alyaa Maan Abdalhamed
Email: alyaa.maen@uodiyala.edu.iq

8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

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

11. Course Evaluation

12. Learning and Teaching Resources

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

Course Description Form

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

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

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

10. Course Structure

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

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

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

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

Course Description Form

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

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

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

10. Course Structure

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

3	4		Heterochromatin, Euchromatin, and Nucleosome Structure	=	=
4	4		Chromosome Replication, Segregation, and Centrosome Function	=	=
5	4		Chromosome Replication, Segregation, and Centrosome Function	=	=
6			EXAM	=	=
7	4		Numerical Chromosomal Abnormalities	=	=
8	4		Structural Chromosomal Abnormalitie	=	=
9	4		Mechanisms of Structural Abnormalities	=	=
10	4		Sex Chromosomes and X-Chromosome Inactivation	=	=
11	4		Sex Chromosome Abnormalities	=	=
12	4		Sample Collection, Cell Culture, and Harvesting Techniques	=	=
13	4		Sample Collection, Cell Culture, and Harvesting Techniques	=	=
14	4		Chromosome Banding Techniques	=	=
15			Second Exam		

11. Course Evaluation

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

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	Chowdhury, M.R., Singh, A., & Dubey, S. (2020). *Role of Cytogenetics and Molecular Genetics in Human Health and Medicine.* In *Animal Biotechnology* (pp. 481-501). Academic Press.
Main References (sources)	
Recommended Books and References (scientific journals,	
Electronic References (websites … etc.)	

Course Description Form

1. Course Name:

Microbiology Genetics

2. Course Code:

BT308

3. Semester/Year:

Semester

4. Description Preparation Date:

1/9/2024

5. Available Attendance Forms:

weekly

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

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

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

8. Course Objectives

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

9. Teaching and Learning Strategies

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

10. Course Structure

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

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Immunology
2. Course Code:
BT306
3. Semester/Year:
Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
30 hour/ 3 unit
7. Course Administrator's Name (mention all, if more than one name)
Name: hahad khaleel ibrahem | Ph.D. in Biology | Lecturer Email: Shahadkhaleel@uodiyala.edu.iq

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

10. Course Structure

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

2	4		Innate host defenses, Anatomical barriers against infections, Humoral barriers against infections, Cellular barriers against infections:	=	=
3	4		Characteristics of non-specific (Innate), Granulocytes:- polymorphonuclear cells	=	=
			Non- granulated cells Monocyte Lymphocytes		
4	4		Characteristics of Acquired Immunity Classification of adaptive immunity	=	=
5	4		Lymph nodes Spleen	=	=
6	4		Mechanisms of IR Primary IR Secondary IR	=	=
7	4		Properties of Immunogen Haptens Adjuvant	=	=
8	4		Structure of Ab Classes of Ab	=	=
9	4		Consequences of Antigen-Antibody Binding Properties of Ag-Ab reaction	=	=
10	4		Pathways of Complement activation	=	=
11	4		Organ specific autoimmune diseases Non -Organ specific autoimmune diseases	=	=
12	4		Central and peripheral tolerance	=	=
13	4		Types of Immune-deficiency Factors cause immune deficiency	=	=
14	4		Immune cell with antitumor activity Tumor associated antigens Immunotherapy	=	=
15	4		Exam	=	=

11. Course Evaluation

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

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	Doan, Thao, et al. *Immunology*. Lippincott Williams & Wilkins, 2012.
Main References (sources)	Buxton, B. A., Jensen, L. A., & Gregg, R. K. (2009). *Lippincott's illustrated Q&A review of microbiology and immunology*. Lippincott Williams & Wilkins.
Recommended Books and References (scientific journals, reports ... etc.)	Rich, R. R., Fleisher, T. A., Shearer, W. T., Schroeder Jr, H. W., Frew, A. J., & Weyand, C. M. (2012). *Clinical immunology e-book: principles and practice*. Elsevier Health Sciences.

1. Course Name:

Mycology

2. Course Code:

BT300

3. Semester / Year:

Semester

4. Description Preparation Date:

22 / 4/ 2024

5. Available Attendance Forms:

Mandatory Attendance

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

3 units (60 study hours)

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

Name:: Najwan Kaleil Ibrahim | Ph.D. in Biology | Lecturer
Email: Najwanabbas@uodiyala.edu.iq

8. Course Objectives

Course Objectives	➢ Introduce students to fungi, their increasing importance, their characteristics, methods of identification, preservation, and classification. ➢ Explain the role of fungi and yeasts in the decomposition of organic and mineral materials, forming active organisms that participate in ecological balance and serve as the second most widespread living group after bacteria. ➢ Familiarize students with the clinical classification of fungi, diagnostic methods, and chemical/microscopic techniques used in fungal studies. ➢ Introduce students to pathogenic fungi, methods of treatment, and beneficial fungi used in industry and biological processes.

This course provides a proposed framework to clarify the objectives of the subject and the expected learning outcomes for students, ensuring that they benefit from the available educational opportunities. It is also necessary to establish a link between the description and the learning outcomes.

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

4. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
First	*(2T+2P)*		**Definition of Mycology**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Second	*(2T+2P)*		Morphology of Fungi – **Molds and yeasts.**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*

Third	*(2T+2P)*		**Fungal Cell Structure and Function**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Four	*(2T+2P)*		**Reproduction of Fungi**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Five	*(2T+2P)*	*Exam.*	*Exam.*	*PowerPoint*	
Six	*(2T+2P)*		Taxonomy of Fungi – **Kingdom 1: Protozoa**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Seven	*(2T+2P)*		Kingdom 2: Straminipila –	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Eight	*(2T+2P)*		Kingdom 3: Fungi – **Phylum 1: Chytridiomycota, Phylum 2: Zygomycota**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Nine	*(2T+2P)*		Phylum 3: Ascomycota – **Classes: Archiascomycetes, Hemiascomycetes**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Ten	*(2T+2P)*		Phylum 3 (continued): Ascomycota – **Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Eleven	*(2T+2P)*		Phylum 3 (continued): Ascomycota – **Classes: Plectoascomycetes, Hymenoascomycetes, Loculoascomycetes**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Twelve	*(2T+2P)*		Phylum 4: Basidiomycota **– Phylum 5: Anamorphic fungi**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Thirteen	*(2T+2P)*		**Phylum 4: Basidiomycota** – Phylum 5: Anamorphic fungi	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Fourteen	*(2T+2P)*		Phylum 4: Basidiomycota **– Phylum 5: Anamorphic fungi**	*PowerPoint+ Kits and Lab. materials*	*Daily Exams*
Fifteen	*(2T+2P)*	*Exam.*	*Exam.*	*PowerPoint*	

5. Course Evaluation

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

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

FOURTH LEVEL

Course Description Form

1. Course Name:	**Bioinformatics**
2. Course Code:	
BT401	
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Department of Biotechnology, College of Science, University of Diyala Email: biotech@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	• Provide students with the basic concepts and applications of bioinformatics and computational biology. • Introduce genome analysis, sequence alignment, and phylogenetics. • Train students on the use of bioinformatics tools for analyzing biological data. • Enable students to perform database searching and sequence comparisons (BLAST, FASTA). • Correlate molecular biology and biochemistry with computational approaches.
9. Teaching and Learning Strategies	
Strategy	• Lectures with PowerPoint presentations. • Laboratory experiments and practical demonstrations. • Seminars, group discussions, and student presentations. • Case studies and problem-solving assignments.

10. Course Structure

Week	**Hours**	**Topics**	**Learning Method**	**Evaluation Method**
1	4 hrs	Introduction to Bioinformatics: what and why?	Lecture	Oral/written exam
2	4 hrs	Genomes and chromosomes, genetic	Lecture, lab	Quiz

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:	**Enzymology**
2. Course Code:	
BT405	
3. Semester/Year:	
Semester	
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
60	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Department of Biotechnology, College of Science, University of Diyala Email: biotech@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	•Understand the importance of enzymes in medical, pharmaceutical, industrial, and agricultural fields. •Learn the methods of enzyme extraction and purification. •Recognize the applications of enzymes in various areas: Medical, Pharmaceutical, Industrial, Agricultural, Research
9. Teaching and Learning Strategies	
Strategy	A. Knowledge and Understanding 1. Define enzymes, their chemical nature, and biological importance. 2. Describe enzyme structure, active sites, and catalytic mechanisms. 3. Explain enzyme classification and nomenclature. 4. Identify enzyme cofactors, inhibitors, and activators. 5. Recognize enzyme kinetics, reaction mechanisms, and regulatory processes. B. Intellectual Skills 1. Interpret experimental data related to enzyme activity. 2. Analyze enzyme kinetics and draw meaningful conclusions. 3. Evaluate enzyme inhibition and activation mechanisms. 4. Apply knowledge of enzymes to practical case studies in medicine, pharmacy, and biotechnology. C. Practical and Professional Skills 1. Conduct laboratory experiments to measure enzyme activity. 2. Use PowerPoint for scientific presentation. 3. Apply laboratory skills in enzyme purification and analysis. 4. Prepare reports and scientific discussions on enzyme-related experiments. General and Transferable Skills 1. Develop teamwork, communication, and problem-solving skills. **2.** Apply quality standards in scientific work. Use scientific references and modern information sources.
10. Course Structure	

Week	**Hours**	Required Learning Outcomes	Learning Method	Evaluation Method

1	**4 hrs**	Introduction: Definition, importance, and properties of enzymes	Lectures, seminars	Oral and written exams
2	**4 hrs**	Enzyme structure, active sites, and catalytic mechanisms	Lectures, seminars	Quizzes
3	**4 hrs**	Enzyme classification and nomenclature	Lectures	Written exam
4	**4 hrs**	Factors affecting enzyme activity (temperature, pH, substrate concentration)	Lectures, lab	Reports, quizzes
5	**4 hrs**	Enzyme kinetics (Michaelis–Menten equation)	Lectures, lab	Midterm exam
6	**4 hrs**	Enzyme inhibition (competitive, non-competitive, uncompetitive)	Lectures, lab	Practical exam
7	**4 hrs**	Enzyme cofactors, coenzymes, and prosthetic groups	Lectures	Oral exam
8	**4 hrs**	Isoenzymes and their clinical importance	Lectures	Quizzes
9	**4 hrs**	Allosteric enzymes and regulation	Lectures, seminars	Assignments
10	**4 hrs**	Applications of enzymes in medicine and pharmacy	Lectures	Reports
11	**4 hrs**	Applications of enzymes in industry and agriculture	Lectures, lab	Practical evaluation
12	**4 hrs**	Revision and final preparation	Lectures, seminars	Written exam
13	**4 hrs**	Second Exam (Final assessment)	Exam	Final exam

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:	**Immunogenetics**
2. Course Code:	**BT 404**
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Department of Biotechnology, College of Science, University of Diyala Email: biotech@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	- Introduce students to the history, scope, and development of immunology. - Identify different types of immunity and the factors influencing them. - Study immune cells, their mechanisms of action, and lymphoid organs. - Understand immune responses, antigens, antibodies, and hypersensitivity reactions. - Explore the major histocompatibility complex (MHC) and its immune relevance. - Examine cytokines and immune signaling molecules.
9. Teaching and Learning Strategies	
Strategy	- Lectures with PowerPoint presentations. - Group discussions and seminars. - Practical laboratory sessions. - Assignments and student presentations.
10. Course Structure	

Week	Hours	Topics	Learning Method	Evaluation Method

Week 1	4 hrs	Introduction to immunology: history, scope, development	Lectures, seminars	Oral and written exams
Week 2	4 hrs	Types of immunity: innate vs adaptive	Lectures, seminars	Quizzes
Week 3	4 hrs	Innate immunity: physical, chemical, and biological barriers	Lectures, lab	Reports, quizzes
Week 4	4 hrs	Inflammation and immune cells	Lectures, lab	Practical exam
Week 5	4 hrs	Adaptive immunity: humoral and cellular responses	Lectures, lab	Midterm exam
Week 6	4 hrs	Lymphoid organs and immune cells	Lectures	Oral exam
Week 7	4 hrs	Antigens: properties and types	Lectures	Quizzes
Week 8	4 hrs	Antigen processing and presentation	Lectures	Assignments
Week 9	4 hrs	Antibodies: structure, function, synthesis	Lectures, lab	Reports
Week 10	4 hrs	Antigen–antibody interactions	Lectures, lab	Practical evaluation
Week 11	4 hrs	Hypersensitivity reactions	Lectures	Quizzes
Week 12	4 hrs	Complement system and immune regulation	Lectures	Written exam
Week 13	4 hrs	Cytokines and immune signaling	Lectures	Assignments
Week 14	4 hrs	Autoimmunity and immunodeficiency	Lectures	Reports
Week 15	4 hrs	Final review and assessment	Lectures	Final exam

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

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

Course Description Form

1. Course Name:	**Industrial Microbiology**
2. Course Code:	BT **302**
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Zainab Abd Mohamed | Ph.D. in Biology | Lecturer Email: Zainababed@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	• Introduce students to the scope and importance of industrial microbiology. • Provide knowledge about the production of important microbial products such as antibiotics, amino acids, organic acids, enzymes, vitamins, vaccines, and food products. • Train students in techniques for isolation, maintenance, and preservation of industrial strains. • Demonstrate microbial production processes such as fermentation for ethanol, single-cell protein, and bioactive metabolites. • Enable students to analyze, optimize, and improve microbial processes for industrial applications.
9. Teaching and Learning Strategies	
Strategy	• Lectures with PowerPoint presentations. • Laboratory experiments and practical demonstrations. • Seminars, group discussions, and student presentations. • Case studies and problem-solving assignments.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Learning Method**	**Evaluation Method**
1	4 hrs	Industrial media and nutrition of microorganisms	Lecture, lab	Oral and written exam
2	4 hrs	Sterility in industrial microbiology	Lecture, lab	Report
3	4 hrs	Maintenance and preservation of	Lecture, lab	Quiz

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

11. Course Evaluation

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

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	• Okafor, N. (2016). *Modern Industrial Microbiology and Biotechnology*. CRC Press. • Waites, M.J., Morgan, N.L., Rockey, J.S., & Higton, G. (2002). *Industrial Microbiology: An Introduction*. Blackwell Science, Oxford, UK.
Main References (sources)	• **Main References (sources)** • Journal of Industrial Microbiology & Biotechnology • Applied Microbiology and Biotechnology Journal
Recommended Books and References (scientific journals, reports ... etc.)	• Food and Industrial Microbiology journals • Bioprocess Engineering references
Electronic References (websites … etc.)	• PubMed and scientific journal websites • International fermentation and biotechnology networks

Course Description Form

1. Course Name:					
Plant Tissue culture					
2. Course Code:					
BT406					
3. Semester / Year:					
Semester program / 2023 – 2024					
4. Description Preparation Date:					
22 4/ 2024					
5. Available Attendance Forms:					
Mandatory Attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
4 weekly (2 hours theoretical part _ 2 hours practical part) + 3 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr Alhan mohammed alwan Email: alhanalwan@gmail.com					
8. Course Objectives					
Course Objectives					
7. Teaching and Learning Strategies *Explaining the basic principles of tissue culture 8. *Clarification of methods for establishing a tissue culture laboratory. 9. *Study of types of plant hormones 10.*Study of types of sterilizers 11.*Study of chemical and hormonal analyses.					
Strategy	The graduate must be able to know and understand all of the following: 1. The basic principles of laboratory establishment methods 2.Knowing and understanding all types of analyzes and plant hormones. 3.Knowing and understanding all laboratory sterilization methods 4.Knowing and understanding all chemical and hormonal analyses				
12. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**

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

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

13.Course Evaluation

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

14.Learning and Teaching Resources

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

Course Description Form

1. Course Name:	**Toxicology**
2. Course Code:	**BT408**
3. Semester/Year:	**2024- 2025**
Semester	**second**
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
60	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Email:	Dr. Najwan Abbas Mohammed najwanabbas@uodiyala.edu.iq
8. Course Objectives	
Course Objectives	1. Understand fundamental principles of toxicology – including dose-response relationships, mechanisms of toxicity, and the factors that influence toxic effects in humans, animals, and the environment. 2. Identify and evaluate toxic agents – such as chemicals, drugs, natural toxins, and environmental pollutants, along with their toxicokinetics (absorption, distribution, metabolism, excretion) and toxicodynamics (biological effects). 3. Apply toxicological knowledge in practice – through risk assessment, interpretation of toxicological data, and applying safety regulations and guidelines in clinical, occupational, pharmaceutical, and environmental contexts.
9. Teaching and Learning Strategies	
Strategy	1. Lectures and Interactive Discussions – to deliver core concepts of toxicology and encourage critical thinking through case-based discussions. 2. Laboratory Sessions and Practical Demonstrations – to give students hands-on experience with toxicological assays, dose-response experiments, and

	safety practices. 3. Problem-Based and Case Study Learning – using real-world toxicology scenarios (e.g., poisoning cases, environmental contamination, drug toxicity) to develop analytical and problem-solving skills. 4. Seminars and Student Presentations – to enhance communication skills and deepen understanding by reviewing toxicology research articles and emerging issues. 5. E-Learning Tools and Simulations – such as virtual labs, toxicology databases, and risk assessment software to supplement traditional teaching**.**

10. Course Structure

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

11. Course Evaluation	
• **Midterm Examination** *Tests understanding of fundamental concepts and principles of toxicology.* • **Laboratory Work / Practical Reports** *Assessment of hands-on skills, safety practices, and data interpretation.* • **Assignments / Case Studies / Presentations** *Evaluates critical thinking, application of toxicology to real-world problems, and communication skills.* • **Quizzes / Continuous Assessment** *Short tests to encourage consistent learning throughout the course.* • **Final Examination**	
12. Learning and Teaching Resources	
Required Textbooks (curricular books, if any)	1.Mycotoxins, (2008) Editor: Leslie. 2. Poisonous plants in Iraq,(1980). Editor:Ali Alrawi 3. Poisonous plants in southern united states,(2005). Editor: John W. Everest et al 4. Algae (2006) Editor: Barsanti and Gualtieri
Main References (sources)	1. Manual Of Methods Of Analysis Of Foods,(2016). By: Food Safety And Standards Authority Of India Ministry Of Health And Family Welfare Government Of India , New Delhi. 2. The Pesticide Manual,(2012). Editor: C. MacBean
Recommended Books and References (scientific journals, reports ... etc.)	1. A Textbook of Modern Toxicology – by Ernest Hodgson. 2. A comprehensive text that provides clear explanations of toxicological principles, with applied examples. 3. Hayes' Principles and Methods of Toxicology – by A. Wallace Hayes. 4. Focuses on methodologies, testing approaches, and practical aspects of toxicological research and safety assessment
Electronic References (websites … etc.)	**Agency for Toxic Substances and Disease Registry (ATSDR)** https://www.atsdr.cdc.gov *Health effects, toxicological profiles, and case studies of hazardous substances.* **U.S. Environmental Protection Agency (EPA) – Toxicology and Risk Assessment** https://www.epa.gov

Course Description Form

1. Course Name:	**Pathological Analyses**
2. Course Code:	**BT305**
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Hiba Ali Hilal Ahmed | MSC. in Biology | Lecturer Email: Hiba.a@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	• Provide students with the fundamental principles of pathological laboratory tests. • Demonstrate the role of pathological analyses in medical diagnosis. • Identify the different types of diagnostic tests and their clinical applications. • Develop knowledge of interpreting results and understanding sources of error in diagnostic testing. • Enhance students' ability to correlate laboratory findings with disease conditions. • Strengthen problem-solving skills in analyzing and evaluating diagnostic results.
9. Teaching and Learning Strategies	
Strategy	• Lectures with PowerPoint presentations. • Laboratory demonstrations and practical experiments. • Group discussions and interactive participation. • Assignments and student seminars. • Field visits and case-based learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Learning Method	Evaluation Method
1	4 hrs	Introduction: importance and	Lecture	Oral questions,

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

11. Course Evaluation

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

12. Learning and Teaching Resources

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

Course Description Form

1. Course Name:
Plant Chemistry
2. Course Code:
BT307
3. Semester/Year:
Semester
4. Description Preparation Date:
1/9/2024
5. Available Attendance Forms:
weekly
6. Number of Credit Hours (Total)/Number of Units (Total)
30 hour/ 3 unit
7. Course Administrator's Name (mention all, if more than one name)
Name: Assistant Professor Dr. Shaymaa Al-Majmaie Email: shaymaa@uodiyala.edu.iq
8. Course Objectives

Course Objectives	By the end of this course, students will be able to: • Explain the fundamentals of molecular biology in both prokaryotic and eukaryotic organisms. • Demonstrate understanding of cellular processes at the molecular level. • Explore the potential applications of plant chemistry in the pharmaceutical, medical, and industrial fields.
9. Teaching and Learning Strategies	
Strategy	Students will: • Understand the principles of plant chemistry, ethnopharmacology, and pharmacognosy. • Gain familiarity with bioactive plant compounds and their physiological effects. • Learn about the therapeutic, toxic, and nutritional aspects of plant constituents. • Recognize the significance of plant-based compounds in the development of modern medicine.

10. Course Structure

Week	Hour	Required	Unit or Subject Name	Learning	Evaluation

	s	Learning Outcomes		Method	Method
1	4		Introduction and Overview	Lecture ,demonstrations ,interactive discussion and self-education	Introduction to computer, basic definition ,interactive discussion and oral and written tests
2	4		History of Plant Use in Medicine (Part I)	=	=
3	4		History of Plant Use in Medicine (Part II)	=	=
			Therapeutic Uses of Plants		
4	4		Pharmacognosy, Ethnopharmacology, and Chemistry of Medicinal Plants	=	=
5	4		Psychoactive Plants	=	=
6	4		Exam	=	=
7	4		Plant-Induced Diseases in Humans and Animals	=	=
8	4		Nutritional and Health Benefits of Food Plants	=	=
9	4		Contribution of Medicinal Plants to Traditional and Modern Medicine	=	=
10	4		Medicinal Plants of the American and Mexican West	=	=
11	4		Plant Investigation Methods	=	=
12	4		Overview of Structural Identification Methods	=	=
13	4		Secondary Metabolism	=	=

14	4		Plant Investigation Methods	=	=
15	4		Exam	=	=

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc	
12. Learning and Teaching Resources	
Required Textbooks (curricular books, if any)	**M. Daniel.** *Medicinal Plants: Chemistry and Properties.* 1st Edition. Textbook of Plant Chemistry (2011).
Main References (sources)	
Recommended Books and References (scientific journals, reports ... etc.)	
Electronic References (websites … etc.)	

1. Course Name:	**Genetic Engineering**
2. Course Code:	**BT403**
3. Semester/Year: Fourth Year	
Semester / First Semester	
4. Description Preparation Date:	
1/9/2024	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total)/Number of Units (Total)	
4 Credit Hours (2 Theoretical + 2 Practical per week, total 60 hours)	
7. Course Administrator's Name (mention all, if more than one name)	
Name: Dr. Nasser Email: biotech@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives	• Cover the fundamental principles of genetic engineering in prokaryotic and eukaryotic systems. • Understand cloning strategies and steps of gene manipulation. • Introduce techniques for DNA isolation, plasmid preparation, and vector construction. • Train students on the application of restriction enzymes and cloning vectors. • Apply theoretical and practical knowledge to modern biotechnological and medical research.
9. Teaching and Learning Strategies	
Strategy	• Lectures with PowerPoint presentations. • Practical laboratory sessions. • Seminars, group discussions, and assignments. • Student presentations and reports.

10. Course Structure

Week	Hours	Topics	Learning Method	Evaluation Method
1	4 hrs	Introduction to Genetic Engineering	Lecture	Oral/written exam
2	4 hrs	Cloning steps	Lecture, lab	Quiz
3	4 hrs	Isolation of total DNA	Lecture, lab	Assignment
4	4 hrs	Isolation of plasmid DNA	Lecture, lab	Practical

5	4 hrs	Restriction enzymes	Lecture, lab	Report
6	4 hrs	Types of restriction enzymes	Lecture, lab	Quiz
7	4 hrs	Factors affecting restriction enzymes	Lecture	First Exam
8	4 hrs	Cloning vectors	Lecture, lab	Assignment
9	4 hrs	Types of cloning vectors	Lecture, lab	Report
10	4 hrs	Plasmids	Lecture, lab	Quiz
11	4 hrs	Phages	Lecture, lab	Practical
12	4 hrs	Cosmids	Lecture, lab	Report
13	4 hrs	Expression vectors	Lecture, lab	Assignment
14	4 hrs	Applications of cloning vectors in genetic engineering	Lecture, lab	Practical evaluation
15	4 hrs	**Second Exam**	Written exam	Final exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required Textbooks (curricular books, if any)	• Glover, D. M. (2013). *Genetic Engineering: Cloning DNA*. Springer Science & Business Media. • Kurnaz, I. A. (2015). *Techniques in Genetic Engineering*. CRC Press.
Main References (sources)	• *Journal of Genetic Engineering and Biotechnology* • *Nature Reviews Genetics* • *Trends in Biotechnology*
Recommended Books and References (scientific journals, reports ... etc.)	• **Electronic References** •
Electronic References (websites … etc.)	• NCBI (https://www.ncbi.nlm.nih.gov/) • PubMed • International genetic engineering databases

Course Description Form

1. Course Name:
Medical Mycology
2. Course Code:
BT410
3. Semester / Year:
Semester program / 2023 – 2024
4. Description Preparation Date:
23 / 4/ 2024
5. Available Attendance Forms:
Mandatory Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 weekly (2 hours theoretical part _ 2 hours practical part) + 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Najwan Abbas Mohammed Email: najwanabbas@gmail.com
8. Course Objectives

Course Objectives	** Defining the group of pathogenic fungi and dividing them into a group of sections base on their pathogenicity* *It also includes introducing the student to fungal diseases, their types, and the m important pathogenic fungal species that cause these diseases. It also aims to kn mycopoisoning and mycotoxins, differentiate between the two types, types of mycotox and types of fungal poisoning resulting from eating poisonous mushrooms.*

9. Teaching and Learning Strategies

Strategy	*At the end of this year, the student must be familiar with the following techniques:* *1. General characteristics and characteristics of medicinal mushrooms.* *2. The most important medicinal fungi, their diseases, and methods of isolation and diagnosis.* *3. Developing the student's descriptive ability and acquiring the skill in diagnosing fung diseases and the most important distinctive symptoms of the disease.* *4. Introducing the student to the types of fungi and the distinctive characteristics of each and gaining the ability to diagnose them*

10. Course Structure

Week	Hours	Required Learning Outcomes	Learning method	Evaluation method

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

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

11.Course Evaluation

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

12.Learning and Teaching Resources

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