Ministry of Higher Education and Scientific Research
University of Diyala
College of Science
Department of Biology

MODULE DESCRIPTION FORM
FIRST CYCLE
LEVEL THREE

وصف المقرر لمسار بولونيا
المستوى الثالث
الدورة الاولى

2025/2026

Semester Five

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Cell Biology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3511**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	**5**	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr. Ibrahim Hadi Mohammed		**e-mail**	dr.ibrahimhadi@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ibrahim Hadi Mohammed		**e-mail**	dr.ibrahimhadi@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand the fundamental structure and function of cells, the basic units of life in all organisms. 2. Differentiate between prokaryotic and eukaryotic cells, as well as between plant and animal cells. 3. Explore the structure and function of major cellular organelles, including the nucleus, mitochondria, endoplasmic reticulum, Golgi apparatus, and cytoskeleton. 4. Gain knowledge of the chemical composition of cells, including biomolecules like proteins, lipids, carbohydrates.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**By the end of this course, students will be able to:** 1. Describe the structure and function of cellular components, including membranes, organelles, and the cytoskeleton. 2. Differentiate between types of cells, such as prokaryotic vs. eukaryotic, and plant vs. animal cells. 3. Explain the mechanisms of membrane transport, including diffusion, osmosis, and active transport.
Indicative Contents المحتويات الإرشادية	Introduction Cell biology

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**62**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**4.1**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 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**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to cell biology
Week 2	Techniques in cell biology
Week 3	Cell Membranes

Week 4	Cell Organelles and Structures
Week 5	Golgi apparatus , Endoplasmic reticulum , Mitochondria, chloroplasts
Week 6	Lysosome , peroxisome, Cytoskeleton
Week 7	Nucleus , Chromosome
Week 8	**Exam**
Week 9	Cell Signaling
Week 10	Cell Division
Week 11	Cell Cycle
Week 12	Apoptosis , programmed Cell death
Week 13	Cell communication
Week 14	Genetic diseases
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Introduction to laboratory techniques
Week 2	Lab 2: Light microscopy and electron
Week 3	Lab 3: Cell fractionation
Week 4	Lab 4: Cell centrifugation
Week 5	Lab 5: Cell culture techniques
Week 6	Lab 6: Cell staining
Week 7	Lab 7: Observation of Cell Types
Week 8	Lab 8: **Exam**
Week 9	Lab 9: Cell Membrane Permeability
Week 10	Lab 10:Mitosis
Week 11	Lab 11: Cell Counting
Week 12	Lab 12: Cell Culture
Week 13	Lab 13: Osmosis and Diffusion
Week 14	Lab 14: Apoptosis Assays
Week 15	Lab 15: **Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Alberts, B., Heald, R., Johnson, A., Morgan, D., Raff, M., Roberts, K., & Walter, P. (2022). Molecular biology of the cell: seventh international student edition with registration card. WW Norton & Company.	No
Recommended Texts	Lodish, H. F., Berk, A., Kaiser, C., Krieger, M., Bretscher, A., Ploegh, H. L., ... & Amon, A. (2021). Molecular cell biology (Vol. 1). New York: WH Freeman.	Yes

Websites	https://www.nature.com/scitable/topic/cell-biology-13906536/ https://rupress.org/jcb

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Ecology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3512**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Munther Hamza Rathi		**e-mail**	Prof.dr.rathi@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Munther Hamza Rathi		**e-mail**	Prof.dr.rathi@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	By the end of this course, students will be able to: 1. Understand core ecological principles • Explain the structure and function of ecosystems, biomes, and major biogeochemical cycles. • Describe the interactions between living organisms and their physical environment. 2. Analyze environmental issues • Identify and evaluate local, regional, and global environmental problems. • Assess human impacts on air, water, soil, and biodiversity. 3. Apply scientific methods to environmental studies • Design and conduct laboratory and field experiments related to environmental factors. • Collect, analyze, and interpret environmental data using appropriate tools and statistical methods. 4. Evaluate sustainability concepts • Explain the principles of sustainable resource use and conservation. • Discuss strategies for balancing environmental, economic, and social needs.
	By the end of this course, students will be able to: 1. Describe the fundamental concepts of ecology, including ecosystem structure,

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	energy flow, and biogeochemical cycles. 2. Identify major environmental problems such as pollution, deforestation, climate change, and biodiversity loss. 3. Explain the impact of human activities on natural resources including air, water, and soil. 4. Design and conduct simple experiments to investigate environmental factors and analyze data using basic statistical tools.
Indicative Contents المحتويات الإرشادية	1. Introduction to Environmental Science • Definition, scope, and importance • Components of the environment (biotic and abiotic factors) • Levels of organization: individual, population, community, ecosystem, biosphere 2. Ecosystems and Ecological Principles • Structure and function of ecosystems • Energy flow and food chains/webs • Biogeochemical cycles (carbon, nitrogen, phosphorus, water cycles) • Ecological succession 3. Biodiversity and Conservation • Importance of biodiversity • Threats to biodiversity: habitat loss, pollution, invasive species • Conservation strategies and protected areas 4. Population Ecology and Dynamics • Population growth models (exponential, logistic) • Carrying capacity and limiting factors • Human population growth and impact 5. Environmental Pollution • Types of pollution: air, water, soil, noise, and thermal pollution • Sources and effects of pollutants • Pollution control methods and technologies.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Ecology- Introduction and terms , Branches of Ecology , Levels organization of Ecology Habitat.
Week 2	Basic principles of Ecosystem
Week 3	Energy flow in the ecosystem, Food chain and food web, Ecological pyramids
Week 4	Some Major Ecosystem
Week 5	Biogeochemical cycles : Gaseous cycles
Week 6	Biogeochemical cycles : Sedimentary cycles
Week 7	**Exam**
Week 8	Primary and secondary productivity
Week 9	Biological interrelationships
Week 10	Limiting factors and tolerance levels : Liebiges law of minimum 1840
Week 11	Limiting factors and tolerance levels : Shelfords law of tolerance 1911
Week 12	Population
Week 13	Biodiversity and its Conservation
Week 14	Environmental organizations
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Temperature measurements
Week 2	Lab 2: Relative humidity
Week 3	Lab 3: Atmospheric pressure

Week 4	Lab 4: Other instruments and devices are used in ecology for different purpose eg. Van Dorn water sampler
Week 5	Lab 5: Turbidity and nephelometer
Week 6	Lab 6: Sampling in Ecology
Week 7	Lab 7: **Exam**
Week 8	Lab 8: Animal Populations Sampling
Week 9	Lab 9: Soil sampling and textures
Week 10	Lab 10: Measurement of productivity
Week 11	Lab 11: Solar soil sterilization (an environmentally-friendly alternative)
Week 12	Lab 12: Demonstrating Liebig's Law of the Minimum
Week 13	Lab 13: Salt stress on plant germination (NaCl gradient)
Week 14	Lab 14: pH effect on seed germination / alge growth .
Week 15	Lab 15: **Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Singh, V. (2024). Textbook of environment and ecology (pp. 217-224). Singapore: Springer.	Yes
Recommended Texts	van Wilgen, B. W. (2024). New ecological textbook for Angola. South African Journal of Science, 120(1/2).	Yes
Websites	https://esa.org/about/what-does-ecology-have-to-do-with-me/ https://www.britannica.com/science/ecology	

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

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Histology**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**Bio-3513**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Anwar Abdulameer Mohammad		**e-mail**	anwarabdulameer@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Anwar Abdulameer Mohammad		**e-mail**	anwarabdulameer@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Introduction to histology , primary tissues their description and features
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students have to know characteristics of each tissue in different organs , to understand functions of each system or organ in the human body .
Indicative Contents المحتويات الإرشادية	1. Introduction to Histology • Definition, scope, and importance of histology • Basic microscopy techniques and preparation of tissue samples 2.Epithelial Tissue • Classification of epithelial tissues • Structure, function, and locations • Specializations (cilia, microvilli, glands) 3. Connective Tissue • Types of connective tissue: loose, dense, cartilage, bone, blood • Components of connective tissue: cells, fibers, matrix • Functions and examples 4. Muscle Tissue • Types: skeletal, cardiac, and smooth muscle • Structure and function of each muscle type

	• Muscle contraction basics 5. Nervous Tissue • Neurons: structure and function • Neuroglia cells • Synapses and nerve impulses 6. Specialized Tissues and Organs • Histology of skin and its derivatives • Histology of blood and lymphatic tissue • Histology of endocrine and exocrine glands.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

	Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to histology and epithelial tissue ,
Week 2	Glandular epithelial tissue , classification of glands and their description and locations
Week 3	Connective tissue , and essential elements of connective tissue
Week 4	Classification of connective tissue , proper connective tissue , their features and locations
Week 5	skeletal connective tissue , cartilage , types of cartilages , locations in addition to cartilage
Week 6	Skeletal connective tissue , Bone , features of bones , matrix
Week 7	Hemopoetic tissue , maturation of erythrocytes and leukocytes
Week 8	**Exam**
Week 9	Muscular tissue , types of muscle , features of each type of muscle
Week 10	Nerve tissue , features of nerves , ,classification of neurons and fibers in addition to glial ceels
Week 11	Circulatory system , divisions of the system , features of arteries and veins …
Week 12	Lymphatic system , features of lymphatic vessel , thymus gland and spleen in addition to ttonsils
Week 13	Integumentary system , epidermis and dermis
Week 14	Hair layers and nail
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Epithelial tissue , types of epithelial (simple and stratified)
Week 2	Lab 2: Glandular epithelial , classification of glands their features
Week 3	Lab 3: Connective tissue , proper (loose connective)
Week 4	Lab 4: cartilage types , hyaline , elastic and white fiber cartilage
Week 5	Lab 5:Bone , organization of bone lamellae
Week 6	Lab 6: **Exam**
Week 7	Lab 7: Histology of bone marrow , red bone marrow and yellow
Week 8	Lab 8: histology of skeletal muscle , smooth and cardiac muscle
Week 9	Lab 9:features of nerve tissue , types of glail and nerve fibers
Week 10	Lab 10: layers of arteries , veins and pericardium
Week 11	Lab 11: skin histology , epidermis and dermis , deat glands and sebaceous glands
Week 12	Lab 12: layers of hair
Week 13	Lab 13: lymphatic organs lymph nods ,spleen and tonsils
Week 14	Lab 14: digestive system histology oral cavity and salivary gland
Week 15	Lab 15: **Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	O'Dowd, G., Bell, S., & Wright, S. (2023). Wheater's Functional Histology, E-Book: A Text and Colour Atlas. Elsevier Health Sciences.	Yes
Recommended Texts	Neumann, P. E., & Neumann, E. E. (2021). General histological woes: Definition and classification of tissues. Clinical Anatomy, 34(5), 794-801.	Yes
Websites	https://www.ncbi.nlm.nih.gov/books/NBK557663/ https://www.open.edu/openlearn/mod/oucontent/view.php?id=65372&section=1	

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

Module Information معلومات المادة الدراسية					
Module Title	**Mycology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3514**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**		**5**
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Anaam Fuad Hussain		**e-mail**	anaamfuad@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr.Anaam Fuad Hussain		**e-mail**	anaamfuad@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introducing the student to fungi in terms of the history of interest in them, their characteristics, methods of diagnosis and preservation, their importance to humans, and the transformations they carry out in mineral and organic materials, as they are organisms with enzymatic activity, and the role of these organisms in maintaining the vital environmental balance. 2. Introducing the student to the classical classification of fungi and the technical developments taking place in this science, such as chemical and molecular methods. 3. Introducing the student to medical fungi, how to treat and prevent them, as well as mycotoxigenic fungi, those used in industry, and biological resistance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Understand the basic biology and classification of fungi, including their morphology, physiology, and life cycles. 2. Identify and describe the major groups of fungi, including yeasts, molds, and mushrooms, using microscopic and macroscopic characteristics.

Indicative Contents المحتويات الإرشادية	1. Introduction to Mycology • Definition and scope of mycology • History and significance of fungi 2. Fungal Morphology and Structure • General characteristics of fungi • Hyphae, mycelium, spores, and reproductive structures 3. Fungal Classification and Taxonomy • Major fungal groups (Zygomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes) • Criteria for classification 4. Fungal Physiology and Nutrition • Growth requirements • Metabolic pathways • Environmental factors affecting fungi 5. Fungal Life Cycles and Reproduction • Sexual and asexual reproduction • Spore formation and dispersal mechanisms 6. Ecology and Economic Importance of Fungi • Role in decomposition and nutrient cycling • Symbiotic relationships (mycorrhizae, lichens) • Industrial and pharmaceutical applications 7. Pathogenic Fungi • Fungal diseases in humans, animals, and plants • Mechanisms of pathogenicity and host response 8. Laboratory Techniques in Mycology • Isolation and cultivation methods • Identification techniques (microscopy, staining, biochemical tests)

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**62**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**4.1**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation **تقييم المادة الدراسية**					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 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**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Mycology definition History of fungi, general characteristics of fungi and relationship among fungi and other organisms
Week 2	Principles of living fungi: Living mode of fungi, Nutrition
Week 3	Morphology of fungi: molds and Yeasts
Week 4	Fungal cell Structure and Function
Week 5	Reproduction of fungi
Week 6	**Exam**
Week 7	Taxonomy of fungi, Kingdom1: protozoa
Week 8	Kingdom II: Straminipila
Week 9	Kingdom III: Fungi , Phylum1: Chytridiomycota, Phylum2: Zygomycota
Week 10	Phylum3: Ascomycota , Class1: Archiascomycetes
Week 11	Phylum3: Ascomycota , Class2: Hemiascomycetes
Week 12	Phylum3: Ascomycota Class3: Plectoascomycetes, Class4: Hymenoascomycetes, Class5: Loculoascomycetes
Week 13	Phylum4: Basidiomycota
Week 14	Phylum5: Anamorphic Fungi
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Laboratory Safety Manual
Week 2	Lab 2:Isolation of Fungi from different sources
Week 3	Lab 3:Study of fungal Morphology Macroscopic and microscopic study

Week 4	Lab4: Study the effects of some physiological parameters on fungal (molds) growth
Week 5	Lab5: Preservation in Fungi
Week 6	Lab 6: Classification of fungi, Kingdom I: Protozoa, Class1: Myxomycetes
Week 7	Lab 7: Kingdom II: Straminipila, Phylum: Oomycota
Week 8	Lab 8: Kingdom III: Fungi , Phylum1: Chytridiomycota
Week 9	**Exam**
Week 10	Lab 9:Phylum2: Zygomycota
Week 11	Lab10: Phylum3: Ascomycota, Class 1: Archiascomycetes, Class 2: Hemiascomycetes Class 3:
Week 12	Lab 11 Phylum3: Ascomycota, Class 4: Hymenoascomycetes (Pyrenomycetes), Class5: Loculoascomycetes
Week 13	Lab 12: Phylum4: Basidiomycota
Week 14	Lab 13: Phylum5:Anamorphic fungi
Week 15	**Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introductory mycology 3 rd ed. (1996)Editor :Alexopoulos and Mims. Introduction to fungi 3 rd. ed.(2007) Editor: Webster and Weber. Parija, S. C., & Rudramurthy, S. M. (Eds.). (2024). Textbook of Fungal Zoonoses and Sapronoses. Springer.	Yes
Recommended Texts	Shanahan, K. (2024). OVERVIEW OF FUNGAL DISEASE AND MEDICAL MYCOLOGY.	Yes
Websites	https://imafungus.pensoft.net/ https://www.merriam-webster.com/dictionary/mycology	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Plant physiology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3515**				
ECTS Credits	4				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Dina Abdulsalam Saad		**e-mail**	dinaabdulsalam@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Dina Abdulsalam Saad		**e-mail**	dinaabdulsalam@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Study the functions of plant organs and identify their general characteristics. 2. Study the mechanisms of plant physiological functions, such as photosynthesis and respiration. 3. Learn the chemical and physical properties of water and the mechanisms of water and salt absorption in plants. 4. Learn about the types of plant growth regulators.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Address the most important mechanisms of water and salt absorption in plants. 2. Identify the most important theories of plant sap ascent. 3. Learn the most important physiological processes in plants, namely photosynthesis and respiration. 4. The student will learn about the interactions of light and darkness in different plants. 5. Address the most important plant growth
Indicative Contents المحتويات الإرشادية	1. Introduction to Plant Physiology • Definition, scope, and importance • Overview of plant cell structure and function 2. Water Relations in Plants • Water uptake, transport, and transpiration • Osmosis, diffusion, and water potential

	• Mechanisms of water movement in plants 3. Mineral Nutrition • Essential nutrients and their roles • Mechanisms of nutrient uptake and transport • Nutrient deficiencies and toxicity symptoms 4. Photosynthesis • Structure and function of chloroplasts • Light and dark reactions (Calvin cycle) • Factors affecting photosynthesis efficiency 5. Respiration in Plants • Aerobic and anaerobic respiration • Glycolysis, Krebs cycle, and electron transport chain 6. Plant Growth and Development • Hormones and growth regulators (auxins, gibberellins, cytokinins, ethylene, abscisic acid) • Seed germination and dormancy • Photoperiodism and flowering.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

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

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Water relationships
Week 2	diffusion and osmosis
Week 3	Plasmolysis
Week 4	Absorption of water
Week 5	Ascent of sap
Week 6	Absorption of mineral salts
Week 7	Active and passive transport
Week 8	**Exam**
Week 9	photosynthesis
Week 10	Dark reaction
Week 11	Respiration
Week 12	Krips cycle
Week 13	Plant growth regulators
Week 14	Cytokinins
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Solution and their types
Week 2	Lab 2: Solution concentration
Week 3	Lab 3: Diffusion
Week 4	Lab 4: Osmosis
Week 5	Lab 5: Plasmolysis and Deplasmolysis
Week 6	Lab 6: Transport elements in plants
Week 7	Lab 7: **Exam**
Week 8	Lab 8: Photosynthesis
Week 9	Lab 9: Transpiration
Week 10	Lab 10: Separation of plant pigments
Week 11	Lab 11: Seeds dormancy

Week 12	Lab 12: Thin layer chromatography (TLC)
Week 13	Lab 13: Respiration
Week 14	Lab 14: The plant hormones
Week 15	Lab 15: **Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Bhatla, S. C., & Lal, M. A. (2023). Plant physiology, development and metabolism. Springer Nature.	Yes
Recommended Texts	Pratap, M. (2025). A Textbook of Plant Physiology. Academic Guru Publishing House.	Yes
Websites	https://www.sciencedirect.com/journal/journal-of-plant-physiology https://bio.libretexts.org/Bookshelves/Botany/Botany_(Ha_Morrow_and_Algiers)/04%3A_Plant_Physiology_and_Regulation	

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Immunology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3516**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Ibtihal Hameed Mohsin		**e-mail**	ibtihalhameed@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Ibtihal Hameed Mohsin		**e-mail**	ibtihalhameed@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1.Understanding the history of immunology: Studying the origins of this science, its historical milestones, and the key scientists and discoveries that contributed to its development. 2. Exploring the fields and development of immunology: Reviewing the medical and research applications of immunology and its recent advancements. 3. Types of immunity and determining factors: Understanding innate and acquired immunity, as well as the genetic and environmental factors influencing immune responses. 4. Immune cells and their mechanisms of action: Studying the different types of immune cells (e.g., T cells, B cells, macrophages) and how they work together to combat pathogens. 5. Lymphoid organs: Identifying the primary and secondary lymphoid organs and their roles in the production and activation of immune cells. 6. Types of immune responses: Differentiating between humoral and cell-mediated responses and understanding their mechanisms.
	A:Cognitive Objectives: 1. Knowledge (Level 1): Develop students' knowledge and their ability to recall learned information. 2. Comprehension (Level 2): Improve the level of understanding and the ability to interpret concepts.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	3. Application (Level 3): Develop practical skills and the ability to apply learned knowledge. 4. Analysis (Level 4): Enhance the ability to break down information into components and examine relationships. 5. Synthesis (Level 5): Develop the ability to integrate and combine ideas to form new concepts. 6. Evaluation (Level 6): Enable students to make judgments about the value and quality of material. B :Skills Objectives (Specific to the Course): 1.Improve students' observation skills. 2.Teach students imitation and modeling skills. 3.Train students in experimental techniques and methods.
Indicative Contents المحتويات الإرشادية	1. Introduction to Immunology • Definition, scope, and historical perspective • Overview of the immune system components 2. Innate Immunity • Physical and chemical barriers • Cells involved in innate immunity (macrophages, neutrophils, NK cells) • Inflammatory response and complement system 3. Adaptive Immunity • Humoral and cell-mediated immunity • B lymphocytes: development, activation, and antibody production • T lymphocytes: types, activation, and functions 4. Antigens and Antibodies • Structure and classification of antigens • Immunoglobulin classes and structure • Antigen-antibody interactions 5. Immune Response Regulation • Cytokines and their roles • Mechanisms of immune tolerance and autoimmunity

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation **تقييم المادة الدراسية**					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10,
	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**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Introduction of immunity
Week 2	Inflammation
Week 3	The Complement System
Week 4	Antibodies & Antigen
Week 5	Adaptive immunity (specific immune defense)
Week 6	Cellular Immunity Response Process
Week 7	Disorders Associated with the Immune System
Week 8	Hypersensitivity
Week 9	Immunological tolerance
Week 10	Autoimmune diseases
Week 11	Reactions to Transplantation
Week 12	Cytokines
Week 13	The role of lymphocytes in adapative immunity
Week 14	phagocytosis
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Clinical Samples (Plasma and Serum)
Week 2	Lab 2: Bactericidal Effect of Normal Serum

Week 3	Lab 3: Immunogens, Antigens, Antibodies and Vaccines
Week 4	Lab 4: Antigen-Antibody Reaction (Serological Tests)
Week 5	Lab 5: Blood Grouping (ABO group)
Week 6	Lab 6: Rose Bengal Test (RBT) Introduction
Week 7	Lab 7: Widal Test
Week 8	Lab 8: C-reactive-protein(CRP)
Week 9	Lab 9: pregnancy test
Week 10	Lab 10: Rheumatoid Factor (RF) Test
Week 11	Lab 11: AOS test
Week 12	Lab 12: ELASA techniques
Week 13	Lab 13: Complete Blood Count with Differential (CBC with Diff)
Week 14	Lab 14: Allergy Testing: Specific IgE for allergens
Week 15	Lab 15: **Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Chin-Hong, P., Joyce, E. A., Karandikar, M., Matloubian, M., Rubio, L. A., Schwartz, B. S., & Levinson, W. E. (2024). Levinson's Review of Medical Microbiology and Immunology: A Guide to Clinical Infectious Disease. McGraw Hill Professional.	Yes
Recommended Texts	Parija, S. C. (2023). Textbook of microbiology and immunology (Vol. 1579). Berlin, Heidelberg, Germany: Springer.	Yes
Websites	https://onlinelibrary.wiley.com/journal/15214141 https://ejimmunology.org/	

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Parasitology**			**Module Delivery**	
Module Type	**Elective**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3517**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Asraa Dawod Farhan		**e-mail**	Asraa@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Asraa Dawod Farhan		**e-mail**	Asraa@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To understand the basic principles of parasitology. 2. Identifying and studying parasites that infect humans and animals in detail 3. 3.Studying aspects of the life of each parasite in terms of external appearance, life cycle, pathological and epidemiological causes, and methods of diagnosis and prevention .For all parasites that cause diseases
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this module students should be able to: 1. Student Learning Outcome. 2. By the end of the course, the students are being able to develop advanced academic knowledge about the concepts and principles of parasitology. 3. List the different terms associated with parasitology. 4. Detail knowledge about the parasitology and its applications. 5. Conducting discussions that enable the student to link causes with natural causes. 6. Having knowledge about the up-to-date advancing and development in this field of subject 7. In addition to learning practically the technique of examining, using, how to collect the different type of specimens and how to prepare it for examinations and be familiar with the results and writing reports. 8. Define the relationships between the parasite and the host. 9. 9. Identify the most important phylums and species that infect humans and

	animals. 10. 10.Discuss the different characteristics of parasites.
Indicative Contents المحتويات الإرشادية	Emotional and value goals 1.Enable students to cooperate with each other in solving practical assignments. 2.Enabling students to focus on the topic of the lesson and harmony and interaction with it. 3.Enabling students to organize the information and data they receive during the lesson. 4.Enabling the students to recreate their way of thinking towards living beings and appreciating the greatness of the Almighty Creator.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	General introduction, history of science Parasites and public relations among animals
Week 2	Parasitism features, types Parasitism, types parasites, and hosts
Week 3	Protozoa and Protozoan Diseases and Life cycle
Week 4	Complementing the genera belonging to the phylum Protozoa
Week 5	Tissue and Blood flagellates (Leishmania spp.)
Week 6	Flagellate: Family Trypanosomatidae, Genus Trypanosoma (African trypanosomiasis / African
Week 7	SubPhylum: Ciliophora
Week 8	**Exam**
Week 9	Phylum Sporozoa (blood and tissue sprozoa parasites)(Plasmodium species)
Week 10	Toxoplasma gondii (toxoplasmosis)
Week 11	Phylum :Platyhelminthes
Week 12	Heterophyes heterophyes (heterophysiaisis)
Week 13	Liver and lung trematodes (Flukes)
Week 14	Fasciola hepatica (Sheep liver fluke infection / fascioliasis)
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Protozoa
Week 2	Lab 2: Phylum: Sarcomastigophora.
Week 3	Lab 3: Blood and Tissue flagellates of human (type of Leishmania)
Week 4	Lab 4: Genus (Trypanosoma)
Week 5	Lab 5: Subphylum: Ciliophora
Week 6	Lab 6: Sporozoa(Plasmodium(Toxoplasma gondii)
Week 7	Lab 7: **Exam**
Week 8	Lab 8: Sporozoa(Plasmodium(Malaria)
Week 9	Lab 9: Flat worms (Platyhelminthes)
Week 10	Lab 10: Trematodes (Flukes)
Week 11	Lab 11: Blood flukes(Schistosoma)
Week 12	Lab 12: Class: Cestoda
Week 13	Lab 13: Taenia saginata (Beef worm),Taenia solium (Pork tape worm)
Week 14	Lab 14: Phylum Nemathelminthes:
Week 15	Lab 15: **Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**

	Text	Available in the Library?
Required Texts	Gunn, A., & Pitt, S. J. (2022). Parasitology: an integrated approach. John Wiley & Sons.	Yes
Recommended Texts	Parija, S. C., & Chaudhury, A. (Eds.). (2022). Textbook of parasitic zoonoses. Singapore: Springer.	Yes
Websites	https://www.britannica.com/science/parasitology	

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Genetics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3611**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**		**6**
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Ibrahim Hadi Mohammed		**e-mail**	dr.ibrahimhadi@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr.Ibrahim Hadi Mohammed		**e-mail**	dr.ibrahimhadi@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Knowledge of genetic material and Mendel first and second laws and chromosomes
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge of genetic material and the nature of its function
Indicative Contents المحتويات الإرشادية	1. Introduction to Genetics • Definition, scope, and historical milestones • Contributions of Mendel and other pioneers 2. Cell Structure and Chromosomes • Structure and function of chromosomes • Chromosome number, morphology, and classification • Cell division: mitosis and meiosis 3. Mendelian Genetics • Laws of inheritance (segregation, independent assortment) • Monohybrid and dihybrid crosses • Test crosses and back crosses 4. Extensions of Mendelian Genetics • Incomplete dominance, codominance, multiple alleles

	• Lethal alleles, pleiotropy, and polygenic inheritance 5. Linkage, Crossing Over, and Genetic Mapping • Concept of linkage and recombination • Mapping genes on chromosomes 6. Sex Determination and Sex-Linked Inheritance • Mechanisms of sex determination in different organisms • Sex-linked, sex-influenced, and sex-limited traits 7. Mutation • Types of mutations: gene, chromosomal, and genomic • Causes and effects of mutations • Mutagenic agents and repair mechanisms 8. DNA Structure and Function • Discovery and molecular structure of DNA and RNA • DNA replication, transcription, and translation 9. Regulation of Gene Expression • Prokaryotic and eukaryotic gene regulation • Operon models and epigenetic mechanisms 10. Genetic Variation and Population Genetics • Sources of genetic variation • Hardy–Weinberg principle and factors affecting equilibrium 11. Genetics in Practice • Genetic engineering and biotechnology applications • Genetic counseling and ethical considerations 12. Laboratory and Analytical Techniques in Genetics • Microscopy, karyotyping, and gel electrophoresis • PCR and molecular markers

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem)	**62**	**Unstructured SWL (h/w)**	**4.1**

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

Module Evaluation **تقييم المادة الدراسية**					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 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**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Introduction to Genetics
Week 2	Mendel First –Law of Segregation and Law of Independent assortment
Week 3	Sex Limited inheritance and Sex linked inheritance
Week 4	Mitosis and Meiosis
Week 5	Chromosome of Human
Week 6	DNA and RNA
Week 7	**Exam**
Week 8	Translation
Week 9	Replication and Multiplication
Week 10	Reproductive Cloning
Week 11	Gen Expression
Week 12	Codon
Week 13	Genetic Engineering
Week 14	Genetic diseases
Week 15	**Exercises**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Introduction to Genetics
Week 2	Lab 2: Exercises Mendel First –Law of Segregation and Law of Independent assortment
Week 3	Lab 3: Exercises Sex Limited inheritance and Sex linked inheritance
Week 4	Lab 4: Study Mitosis and Meiosis in cell

Week 5	Lab 5: Study and selection Chromosome of Human
Week 6	Lab 6: Study purification DNA
Week 7	Lab 7: Study purification RNA
Week 8	Lab 8: **Exercises**
Week 9	Lab 9: Study purification protein
Week 10	Lab 10: Study wastran bloting
Week 11	Lab 11: Study PCR
Week 12	Lab 12: Electrophoresis
Week 13	Lab 13: plasmid
Week 14	Lab 14: study genetic diseases
Week 15	Lab 15: **Exercises**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Bodmer, W. F., & Charlesworth, B. (2025). Mendelian genetics and eugenics. The American Journal of Human Genetics, 112(1), 196-197.	Yes
Recommended Texts	Martens, A. T., & Hilser, V. J. (2025). Chaperone saturation mediates translation and protein folding efficiency. bioRxiv, 2025-06.	Yes
Websites	https://www.britannica.com/science/genetics https://medlineplus.gov/genetics/	

Grading Scheme **مخطط الدرجات**				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Environmental Pollution			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Bio-3612				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Munther Hamza Rathi		**e-mail**	Prof.dr.rathi@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Munther Hamza Rathi		**e-mail**	Prof.dr.rathi@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	A. Knowledge and Understanding: 1. Acquire fundamental knowledge of the sources, types, and causes of environmental pollution. 2. Understand the physical, chemical, and biological impacts of pollution on ecosystems and human health. 3. Recognize international and local regulations, standards, and policies related to environmental protection. B. Intellectual Skills: 1. Analyze the relationships between pollution sources, environmental processes, and their effects. 2. Evaluate scientific data related to pollution measurement and control. 3. Propose solutions and mitigation strategies for different types of environmental pollution. C. Practical and Professional Skills: 1. Apply appropriate techniques to measure and monitor air, water, and soil pollutants. 2. Interpret laboratory and field data to assess pollution levels. 3. Implement basic environmental management practices in real-world scenarios.
	By the end of this course, students will be able to: 1. Knowledge and Understanding: • Define the main types and sources of environmental pollution .

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain the chemical, physical, and biological mechanisms through which pollutants affect ecosystems and human health. • Describe relevant environmental laws, policies, and standards. 2. Intellectual Skills • Analyze environmental problems using scientific data and evidence. • Evaluate pollution control technologies and management strategies. • Propose practical solutions to reduce or prevent pollution. 3. Practical and Professional Skills: • Perform basic laboratory and field measurements for air, water, and soil pollutants. • Interpret pollution monitoring results to assess environmental quality. • Apply safety and environmental protection guidelines during field and lab work.
Indicative Contents المحتويات الإرشادية	Indicative Contents: Environmental Pollution 1. Introduction to Environmental Pollution: definitions, scope, and significance. 2. Types of Pollution: air, water, soil, noise, and radioactive pollution. 3. Sources and Causes of Pollution: natural vs. anthropogenic sources. 4. Air Pollution: major pollutants, sources, effects, and control methods. 5. Water Pollution: types of pollutants, sources, impact on aquatic life and human health. 6. Soil Pollution: contaminants, causes, and effects on agriculture and ecosystems. 7. Noise Pollution: sources, measurement, and health impacts. 8. Radioactive Pollution: sources, hazards, and safety measures.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**62**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**4.1**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 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**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Definition , Degrees of Ecological pollution , pollutants , Some terms of pollution
Week 2	The effects of environmental pollution on (Human , Animals , Plants , Materials)
Week 3	Air pollution
Week 4	Air pollution
Week 5	Global air pollutants
Week 6	Smog, Plastic pollution
Week 7	**Exam**
Week 8	Water pollution
Week 9	Thermal pollution
Week 10	Oil pollution
Week 11	Food pollution
Week 12	Soil pollution
Week 13	Nuclear pollution
Week 14	Bioremediation , monitoring pollution , Environmental sanitation
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Dissolved oxygen (DO)
Week 2	Lab 2: Biological Oxygen Demand (BOD)
Week 3	Lab 3: Free CO2 in water
Week 4	Lab 4: Measuring Of Salinity
Week 5	Lab 5: Soil pollution
Week 6	Lab 6: Determination of Calcium in Water
Week 7	Lab 7: Determination of Magnesium in Water

Week 8	Lab 8: **Exam**
Week 9	Lab 9: Air pollution (Air Pollution Catcher)
Week 10	Lab 10: Micro plastic Pollution and Its Impact on Human Health
Week 11	Lab 11: Acidity in water
Week 12	Lab 12: alkalinity in water
Week 13	Lab 13: Free chlorine Information
Week 14	Lab 14: Total hardness of water
Week 15	Lab 15: **Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Warouw, Z. W. M., Purba, E. R., Tumewu, W. A., Wowor, E. C., & Wola, B. R. (2024). Development of interactive multimedia on environmental pollution topics with STEM approach for junior high school students. BIO-INOVED: Jurnal Biologi-Inovasi Pendidikan, 6(3), 342-352.	Yes
Recommended Texts	Kehar, N., Suhag, A. K., Chandio, M., Kehar, B. U. Z., & Shah, S. (2025). Examining the Environmental Education Themes Presented in Grade 8 Social Studies Sindh Textbook Board Jamshoro, Sindh. Regional Lens, 4(1), 151-161.	Yes
Websites	https://www.enelgreenpower.com/learning-hub/environmental-pollution https://www.britannica.com/science/pollution-environment	

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Animal Physiology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3613**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Anwar Abdulameer Mohammed		**e-mail**	anwarabdulameer@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Anwar Abdulameer Mohammed		**e-mail**	anwarabdulameer@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Introduction to physiology , understand function of each system of human body
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students have to know role of each system in the body to maintain homeotsis.
Indicative Contents المحتويات الإرشادية	1. Introduction to Animal Physiology • Definition and scope • Relationship between structure and function • Levels of organization in animals 2. Nervous System Physiology • Structure and function of neurons • Nerve impulse transmission • Synaptic transmission • Reflex actions and neural integration 3. Circulatory System • Structure and function of the heart • Blood vessels and circulation • Blood composition and functions • Cardiac cycle and regulation

	4. Digestive System Physiology • Structure and function of digestive organs • Enzymatic digestion and absorption • Regulation of digestive processes 5. Endocrine System • Hormones and their functions • Mechanism of hormone action • Major endocrine glands and physiological roles

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to physiology , principles of physiology and its association with anatomy
Week 2	Physiology of nervous system , divisions of the system , characteristics of plasma membrane
Week 3	Plasma membrane polarization , rest potential , action potential , threshold
Week 4	Synapses , types of synapses , neurotransmitters
Week 5	Conductivity of nerve impulses , stages of changing acetyl-choline and nor-adrenalin
Week 6	**Exam**
Week 7	Endocrine of system , mechanism of hormone action
Week 8	Pituitary gland structure , anterior lobe and posterior lobe hormones
Week 9	Thyroid gland and parathyroid description and hormones , important role of the hormones
Week 10	Adrenal gland cortex and medulla , description of each part of the gland and hormone secreted
Week 11	Physiology of digestive system , introduction to digestion ,role of salivary gland in digestion
Week 12	Role of stomach in digestion , role of gastric gland in digestion
Week 13	Intestinal stage of digestion in small intestine
Week 14	Second midterm exam
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Physiology of circulatory system , the blood ,PCV and ESR
Week 2	Lab 2: Counting of erythrocytes and leukocytes
Week 3	Lab 3: Estimation level of Hb and clotting time
Week 4	Lab 4: Blood groups and RH
Week 5	Lab 5: principles of estimation blood glucose level
Week 6	Lab 6: **Exam**
Week 7	Lab 7: Physiology of plasma membrane (selective permeability , hydrostatic pressure)
Week 8	Lab 8: Physiology of digestive enzymes like amylase , lipase , trypsin
Week 9	Lab 9: Estimation of albumin with laboratory
Week 10	Lab 10: Estimation of cholesterol and HLD
Week 11	Lab 11: Estimation of urea and creatinin
Week 12	Lab 12: Action of liver enzymes
Week 13	Lab 13: **Exam**
Week 14	Lab 14: different modern available fast and easy test for hormones
Week 15	Lab 15: important available test in laboratory for different pathological conditions

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

Required Texts	Khan, M., Khinchi, P. J., Sampath, M. V., & Hemavathi, B. (2023). A textbook of animal physiology. Academic Guru Publishing House.	Yes
Recommended Texts	Khurana, I., & Khurana, A. (2025). Concise Textbook of Physiology-E-Book. Elsevier Health Sciences.	Yes
Websites	https://www.britannica.com/science/physiology https://www.physiology.org/career/teaching-learning-resources/student-resources/what-is-physiology?SSO=Y https://health-sciences.nwu.ac.za/physiology	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Biotoxicology**			**Module Delivery**	
Module Type	**Elective**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3614**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Anaam Fuad Hussain		**e-mail**	anaamfuad@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Anaam Fuad Hussain		**e-mail**	anaamfuad@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introducing the student to the science of toxicology in terms of the history of interest in it, its characteristics and its importance to humans and animals, and in the transformations carried out by living organisms on organic and mineral materials because they are organisms with enzymatic activity and the role of these organisms in producing toxins inside and outside the body of the living organism. 2. Study the effects of toxins on the physiologic, metabolic, reproductive, and developmental processes and body organ functions 3. Introducing the student to the technical developments taking place in this science, such as chemical and molecular methods. 4. Introducing the student to harmful toxins, studying their properties, how to remove them from the body, and knowing those that are used in the chemical and therapeutic industries.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding 1. Define biological toxins and classify them according to their origin, structure, and mode of action. 2. Describe the sources of toxins produced by plants, animals, bacteria, fungi, and marine organisms. 3. Explain the biochemical mechanisms of toxicity and the physiological effects on target organisms. 4. Identify factors affecting toxin stability, potency, and environmental persistence.

	Cognitive Skills 1. Analyze case studies of toxin-related illnesses and outbreaks. 2. Interpret laboratory results related to toxin detection and quantification. 3. Evaluate the risks of biological toxins in food, water, and the environment. Practical and Laboratory Skills 1. Apply standard laboratory techniques for isolation, identification, and quantification of biological toxins. 2. Follow biosafety guidelines in handling and disposal of toxic biological materials.
Indicative Contents المحتويات الإرشادية	1. Toxins and their sources 2. Biological toxins, their sources, and their effects on the organism producing and exposed to them 3. Know the benefits and harms of biotoxins 4. Study the biological transformations of toxins and manage the risks resulting from them 5. How to deal with toxic organisms 6. How to detect biotoxins 7. Isolation and purification of toxins 8. Knowing the lethal dose of toxins 9. Knowing the time period for the toxic effect to appear 10. How to detoxify and get rid of toxin from the body 11. The possibility of benefiting from toxic secondary metabolites in living organisms

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

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

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Toxicology (Definition & History of toxicity and biotoxins).
Week 2	Scope and ethical principles of Toxicology
Week 3	Biotransformation of Xenobiotics and Toxikinetics
Week 4	Hepatotoxicity: Mycotoxins
Week 5	Hepatotoxicity: Pyrrolizidines
Week 6	Algal hepatotoxicity
Week 7	**Exam**
Week 8	Neurotoxicity
Week 9	Nephrotoxicity
Week 10	Toxicity of the Skin and Intestine
Week 11	Respiratory Toxicity
Week 12	Cardiovascular Toxicity
Week 13	Toxicity of Male and Female Reproductive System
Week 14	Interesting of biotoxins
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Laboratory Planning and Preparation for Use
Week 2	Lab 2: Laboratory Equipment used in Toxicology Lab.
Week 3	Lab 3: Toxin Use Practices (reconstitution, dilution, administration)
Week 4	Lab4: Colorimetric method for detection of toxic secondary metabolites
Week 5	Lab5: Detection for Alkaloids by Precipitation Reactions
Week 6	Lab 6: Detection the cellular toxicity
Week 7	Lab 7: Detection the chemical contents for secondary metabolites of toxic organisms Gas Chromatography Mass Spectrometry(GCMS) Technique
Week 8	Lab 8:**Exam**

Week 9	Lab 9: Detection of biotoxins by Thin layer chromatography (TLC) technique
Week 10	Lab 10: Detection of biotoxins by High Liquid Performance Chromatography (HPLC) technique
Week 11	Lab11: Detection of biotoxins by enzyme linked Immunosorbent assay (ELISA) technique
Week 12	Lab 12: Determination of (Lethal Dose 50) LD50 toxin in experimental animal
Week 13	Lab 13: Cytotoxicity Assay of snake venom *(In Vitro*)
Week 14	Lab 14: Histological effects of biotoxins (*In Vivo)*
Week 15	Lab 14: **Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Mycotoxins, (2008) Editor: Leslie. Poisonous plants in Iraq,(1980). Editor:Ali Alrawi Poisonous plants in southern united states,(2005). Editor: John W. Everest et al Algae (2006) Editor: Barsanti and Gualtieri Antibiotics Resistance of Bacteria to Antibiotics(2010) Dr. Editor:Mohammed F. Al-Marjani	Yes
Recommended Texts	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. The Pesticide Manual,(2012). Editor: C. MacBean.	Yes
Websites	https://poisoncontrol.utah.edu/publiced/plants https://poisonousplants.cvmbs.colostate.edu/home https://www.biotoxdoc.eu/ https://mycotoxinsite.com/home/?lang=en	

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microbiology (Aquatic and Soil)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3615**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		3	**Semester of Delivery**		**6**
Administering Department		Dept. of Biology	**College**	College of Science	
Module Leader	Dr. Iman Abbas Ali		**e-mail**	imanabbas@uodiyala.edu.iq	
Module Leader's Acad. Title		Assistant professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr. Iman Abbas Ali		**e-mail**	imanabbas@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Enabling students to gain knowledge and understanding of microorganisms in soil and water 2. Enabling students to gain knowledge and understanding of life cycles in soil 3. Enabling students to gain knowledge and understanding of the most important cycles in water 4. Enabling students to gain knowledge and understanding of the decomposition of materials in soil and the role of microorganisms in it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand :Different types of environmental pollution and their effects. Understand: The importance of biodiversity in maintaining ecological balance. Application: Water management techniques in agriculture. Analysis: The impact of fertilizer use on soil quality. Evaluation: The impact of industrial activities on air and water pollution. Innovation: Innovative solutions to the problem of water pollution.
Indicative Contents المحتويات الإرشادية	The guiding contents of the Water Environment and Soil Pollution course include a study of the sources of water and soil pollution, their effects on the environment and health, in addition to methods of prevention and treatment.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Soil Physical Properties
Week 2	Biotic factors
Week 3	Soil Microorganisms

Week 4	Contribution of Microbes to Nutrient Cycling
Week 5	**Exam**
Week 6	Climate Change and its impact on the microbial environment
Week 7	Pesticides and Microbes as Agents For Recycling Wastes (Detoxification and Biodegradation)
Week 8	Microbes as Agents for Recycling Wastes(Detoxification and Biodegradation)
Week 9	Water microbiology
Week 10	**Exam**
Week 11	What is a Salt water
Week 12	What is a Drinking Water Treatment Plant
Week 13	Liquid Waste (Sewage/Wastewater) Treatment
Week 14	Transporting Microorganisms throw waste water
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1: Components of Soil
Week 2	Lab 2: Enumeration of Soil Microorganism
Week 3	Lab 3: Isolation of soil yeast
Week 4	Lab 4: Isolation of Actinomycetes
Week 5	Lab 5: **Exam**
Week 6	Lab 6: Study of starch degradation by soil bacteria isolates
Week 7	Lab 7: Nitrogen cycle
Week 8	Lab 8: Carbon Cycle
Week 9	Lab 9: Isolation of Soil
Week 10	Lab 10: **Exam**
Week 11	Lab 11: Cellulytic Microorganism
Week 12	Lab 12: Winogradsky column
Week 13	Lab 13: Isolation of *E.Coli* bacteria from water
Week 14	Lab 14: The method bacterial culture
Week 15	Lab 15: **Exam**

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Dubey, R. C., & Maheshwari, D. K. (2023). A textbook of microbiology. S. Chand Publishing.	Yes
Recommended Texts	Pandey, P. K., Mallik, S. K., & Yumnam, R. (Eds.). (2024). Handbook of Aquatic Microbiology. CRC Press. Gentry, T., Fuhrmann, J. J., & Zuberer, D. A. (Eds.). (2021). Principles and applications of soil microbiology. Elsevier.	Yes

Websites	https://www.mdpi.com/journal/sustainability/special_issues/Microbial_Ecosystems

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
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	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microbial Physiology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3616**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		3	**Semester of Delivery**		6
Administering Department		Dept. of Biology	**College**	College of Science	
Module Leader	Dr.Ibtihal Hameed Mohsin		**e-mail**	ibtihalhameed@uodiyala.edu.iq	
Module Leader's Acad. Title		Assistant professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr.Ibtihal Hameed Mohsin		**e-mail**	ibtihalhameed@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1.Introduce the principles of microbial physiology as a branch of the life sciences. 2.Differentiate between eukaryotic and prokaryotic microorganisms. 3.Identify bacterial cell structures and understand their functions. 4.Understand the nutritional aspects of microorganisms and their methods of obtaining energy. 5.Study bacterial growth and learn methods for its estimation and calculation. 6.Understand catabolic and anabolic metabolic pathways in bacterial cells.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A. Subject-Specific Skills: 1. Develop understanding and familiarity with the fundamental concepts presented within the various facts encountered in practical work. 2. Understand the interconnections between these concepts. 3. Establish a strong and solid foundation in microbial physiology. 4. Develop the ability to read and comprehend related scientific research and literature. B .Course-Specific Skills Objectives 1.Knowledge and Recall Skills 2.Comprehension and Analysis Skills 3. Application and Development Skills
Indicative Contents	1. Introduction to Microbial Physiology

المحتويات الإرشادية	• Scope and importance of microbial physiology • Overview of microbial cell structure and function 2. Microbial Cell Structure • Prokaryotic vs. eukaryotic microorganisms • Cell wall composition and differences (Gram-positive, Gram-negative, Archaea) • Cell membrane structure and transport systems 3. Microbial Growth • Growth phases and growth curve • Measurement of microbial growth • Factors affecting growth: temperature, pH, osmotic pressure, oxygen 4. Nutritional Requirements of Microorganisms • Macronutrients and micronutrients • Types of microbial nutrition (autotrophs, heterotrophs, phototrophs, chemotrophs) • Uptake and transport of nutrients 5. Microbial Metabolism • Overview of catabolism and anabolism • Enzymes and coenzymes • Energy production pathways: glycolysis, TCA cycle, oxidative phosphorylation • Fermentation pathways 6. Bacterial Respiration and Photosynthesis • Aerobic and anaerobic respiration • Electron transport chain • Photosynthetic microorganisms and pigments 7. Regulation of Microbial Metabolism • Feedback inhibition • Enzyme regulation • Genetic control of metabolic pathways 8. Adaptations to Extreme Environments • Psychrophiles, thermophiles, acidophiles, alkaliphiles, halophiles • Mechanisms of adaptation 9. Microbial Communication and Interaction • Quorum sensing • Biofilm formation • Symbiosis and antagonism

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative

	assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Bacterial cell: Structure and Function
Week 2	Microbial Nutrition
Week 3	Uptake of Nutrients (transport mechanisms)
Week 4	Microbial Growth
Week 5	Influence of Environmental Factors on Growth: Solutes and Water Activity, pH, Temperature, Oxygen concentration , Radiation.
Week 6	Metabolism; Energy
Week 7	Oxidation-Reduction Reactions
Week 8	Electron Carriers
Week 9	Energy Release and Conservation
Week 10	Catabolism of Carbohydrates
Week 11	Catabolism of Proteins
Week 12	Catabolism of Lipids
Week 13	Anabolism (Biosynthesis); Synthesis of Sugars, Polysaccharides, synthesis of Purines, Pyrimidines, Nucleotides and Lipid synthesis.
Week 14	Synthesis of Amino Acids
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Culture Media
Week 2	Lab 2: Bacterial Counting
Week 3	Lab 3: Bacterial Growth Curve
Week 4	Lab 4: Growth Yield
Week 5	Lab 5: growth requirements
Week 6	Lab 6: The Effects of pH on Growth
Week 7	Lab 7: The Effects of Osmotic pressure on Growth
Week 8	Lab 8: The Effects of Temperature on Growth
Week 9	Lab 9: Effect of antimicrobial agents on microbial growth
Week 10	Lab 10: Major groups of antimicrobial agents
Week 11	Lab 11: Phenol and phenolic compounds.
Week 12	Lab 12: Alcohol, Halogens
Week 13	Lab 13: Heavy metals.
Week 14	Lab 14: Dey's, Detergents
Week 15	Lab 15: **Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mohammadi, A. T., Karami, S., Jahandideh, A., Sarejloo, S., Vaseghi, S., Rezaei, M. D., ... & Gholami, S. (2022). Human diseases Research and textbook 1: Heart, Diabetes, Bacterial, ADHD, skin. Nobel TM.	Yes
Recommended Texts	Mahon, C. R. (2022). Bacterial cell structure, physiology, metabolism, and genetics. Textbook of Diagnostic Microbiology, 1.	Yes
Websites	https://www.omicsonline.org/microbial-physiology/articles.php https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/microbial-physiology	

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

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Biological Control**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Bio-3617**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Dept. of Biology		**College**	College of Science	
Module Leader	Dr.Sanna Najim Abed		**e-mail**	sanaa.abed@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr.Sanna Najim Abed		**e-mail**	sanaa.abed@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Upon completion of this course, students will be able to: 1. Explain the principles and history of biological control. 2. Identify different types of natural enemies (predators, parasitoids, pathogens). 3. Understand ecological interactions influencing biological control. 4. Evaluate the advantages and limitations of biological control strategies. 5. Apply laboratory and field techniques to study biological control agents.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge and Understanding • Define the principles and concepts of biological control in pest management. • Identify major biological control agents, including predators, parasitoids, and pathogens. • Explain the ecological and environmental factors influencing the success of biological control. • Describe classical, augmentative, and conservation biological control strategies. 2. Intellectual Skills • Analyze case studies of successful and unsuccessful biological control programs. • Evaluate the advantages, limitations, and potential risks of using biological control agents. • Compare biological control methods with chemical and cultural pest control strategies.

	3. Practical and Professional Skills • Demonstrate techniques for identifying and monitoring biological control agents in the field or laboratory. • Apply appropriate methods for introducing and managing beneficial organisms. • Design a basic biological control program for a selected pest species.
Indicative Contents المحتويات الإرشادية	1. Introduction to Biological Control • Definition, history, and importance in pest management. • Role in sustainable agriculture and integrated pest management (IPM). 2. Types of Biological Control • Classical biological control – introduction of natural enemies from the pest's origin. • Augmentative biological control – mass production and periodic release of natural enemies. • Conservation biological control – protecting and enhancing existing natural enemies. 3. Agents of Biological Control • Predators: characteristics, examples, and ecological role. • Parasitoids: life cycles, host specificity, and applications. • Pathogens: fungi, bacteria, viruses, and nematodes in pest control. 4. Ecological Principles of Biological Control • Pest–natural enemy interactions. • Population dynamics and control thresholds. • Factors affecting effectiveness (climate, habitat, crop diversity). 5. Mass Rearing and Release Methods • Laboratory rearing techniques for beneficial organisms. • Field release strategies and timing. 6. Evaluation of Biological Control Programs • Monitoring and assessment methods. • Success indicators and impact measurement.

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	1. Lessons of all units will be offered in an interaction lecture where student participation is mandatory either by forming small discussion groups in class, or b exchanging ideas and question one another. 2. Where applicable students will be assigned problems to solve and encouraged to assess one another. 3. Learning material will be supplied to students in class or uploaded on Blackboard learning management system. 4. Students will also be regularly referred to relevant section of the prescribed text book. 5. Most of the tutorial work will be done as self-study or with the assistance of a tutor. 6. The teacher will facilitate lectures and laboratory experiment sessions with the assistance of a tutor or laboratory demonstrator. Assessment will be both formative and summative. Formative assessment refers to assessment whose purpose is to monitor student learning but will not be graded. Summative assessment refers to assessment given to students for grading such as theory tests, practical tests and examination.

Student Workload (SWL) **الحمل الدراسي للطالب محسوب لـ 15 اسبوعا**

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**63**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**4.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**37**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**2.4**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	Introduction to Biological Control: Concepts and History
Week 2	Types of Biological Control: Classical, Augmentative, and Conservation
Week 3	Natural Enemies: Predators, Parasitoids, and Pathogens
Week 4	Ecological Principles of Biological Control
Week 5	Host-Parasite and Host-Predator Interactions
Week 6	Microbial Control Agents: Bacteria, Fungi, Viruses, and Nematodes
Week 7	Entomopathogenic Fungi and Their Applications
Week 8	Entomopathogenic Nematodes in Pest Management
Week 9	Plant-Microbe Interactions in Biological Control
Week 10	Role of Biological Control in Integrated Pest Management (IPM)
Week 11	Case Studies of Successful Biological Control Programs
Week 12	Risks and Non-target Effects of Biological Control
Week 13	Regulatory and Ethical Considerations
Week 14	Recent Advances and Future Trends in Biological Control
Week 15	**Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	Lab 1:Identification of Natural Enemies in the Laboratory
Week 2	Lab 2:Rearing of Predators and Parasitoids

Week 3	Lab 3:Maintenance of Predators and Parasitoids
Week 4	Lab 4:Isolation of Entomopathogenic Fungi
Week 5	Lab 5:Culturing of Entomopathogenic Fungi
Week 6	Lab 6:Bioassays for Testing Pathogenicity of Microbial Control Agents
Week 7	Lab 7:Application Methods of Biological Control Agents in the Field
Week 8	Lab 8:**Exam**
Week 9	Lab 9:Monitoring and Evaluating Biological Control Efficacy
Week 10	Lab 10:Sampling Techniques for Pests and Natural Enemies
Week 11	Lab 11:Microscopy Techniques for Studying Pathogens/1
Week 12	Lab 12:Microscopy Techniques for Studying Pathogens/2
Week 13	Lab 13:Data Collection and Statistical Analysis in Biological Control Studies
Week 14	Lab 14: Student Project Presentations on Selected Biological Control Agents
Week 15	Lab 15: **Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Tanda, A. S. (2024). Advances in Biological Control Pest Management Technology. IK International Pvt Ltd. Corley, J. C., & Villacide, J. M. (2025). Ecology and biological control. In Biological Control of Insect Pests in Plantation Forests (pp. 95-113). Cham: Springer Nature Switzerland. Copping, L. G. (2009). The manual of biocontrol agents (formerly the Biopesticide Manual). British Crop Production Council (BCPC), Farnham.	Yes
Recommended Texts	Mason, P. G. (2021). Biological control: global impacts, challenges and future directions of pest management. Csiro Publishing.	Yes
Websites	https://www.nj.gov/agriculture/divisions/pi/prog/buglab/what-is-biological-control/ https://www.cabi.org/what-we-do/invasive-species/biocontrol/	

Grading Scheme
مخطط الدرجات

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