



Ministry of Higher Education and
Scientific Research - Iraq
AL Mustaqba University
College of science
Department of biology



"COURSE PORTFOLIO"

Module Information

معلومات المادة الدراسية

Module Title	Ecology		
Module Type			
Module Code			
ECTS Credits			
SWL (hr/sem)			
Module Level	3	Semester	5
Department	Biology	College	College of science
Module Leader	Dhurgham ali abbas	E-mail	dhurgham.ali.abbas@uomus.edu.iq
Module Leader's Acad. Title	Professor Dr.	Module Leader's Qualification	PhD
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/08/2025	Version Number	1.0

Student Workload (SWL): Structured SWL (h/w) (Two contact hours of lectures) + Unstructured SWL (h/w) .

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem)	45	Structured SWL (h/w)	3
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	



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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	90		

Relation with other Modules:-

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

COURSE DESCRIPTION:	This course provides a comprehensive introduction to ecology, focusing on the interactions between organisms and their biotic and abiotic environments. It covers ecosystem structure, energy flow, nutrient cycling, population dynamics, community interactions, and ecological succession. The laboratory component emphasizes practical skills in field sampling, measurement of environmental parameters (temperature, humidity, pH, EC, turbidity, DO), soil texture analysis, primary productivity estimation, and biodiversity assessment.
Module Aims أهداف المادة الدراسية	<ol style="list-style-type: none">1- To understand the basic concepts and levels of ecological organization.2- To study the effects of abiotic factors (temperature, light, water, soil) on organisms and ecosystems.3- To analyze energy flow and nutrient cycling (carbon, nitrogen, phosphorus) in ecosystems.



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Scientific Research - Iraq
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Department of biology



	<ul style="list-style-type: none">4- To understand population dynamics, growth models (exponential and logistic), and reproductive strategies (r/K selection).5- To explore community ecology, ecological succession, and climax communities.6- To apply practical skills in field sampling, measurement of environmental variables, and laboratory analysis.7- To evaluate human impacts on ecosystems and discuss conservation strategies.	
<p>Module Learning Outcomes</p> <p>مخرجات التعلم للمادة الدراسية</p>	CODE	Learning Outcomes
	LO1	Define ecology, ecosystem, and levels of ecological organization.
	LO2	Identify biotic and abiotic components of ecosystems.
	LO3	Measure temperature, humidity, and atmospheric pressure using standard instruments.
	LO4	Measure pH, electrical conductivity (EC), and turbidity in soil and water samples.
	LO5	Classify soil texture using sieve and hydrometer methods and the soil texture triangle.
	LO6	Explain Liebig's Law of the Minimum and Shelford's Law of Tolerance and apply them to ecological scenarios.
	LO7	Describe energy flow, food chains, food webs, and ecological pyramids.
	LO8	Analyze the carbon, nitrogen, and phosphorus cycles and their environmental impacts.
	LO9	Differentiate between r-selected and K-selected species based on life history traits.
	LO10	Describe population growth models (exponential and logistic) and calculate population density and dispersion.
<p>Indicative Contents</p> <p>المحتويات الإرشادية</p>	<ol style="list-style-type: none">1. Introduction to Ecology: Definition, levels of organization, biosphere, ecosystem components.2. Abiotic Factors: Temperature, light, water, wind, pressure, soil.3. Measurement of Abiotic Factors: Thermometer, hygrometer, barometer, dew point apparatus.4. Soil & Water Analysis: pH, electrical conductivity (EC), turbidity (nephelometer).	



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5. Soil Texture Analysis: Sieve method, hydrometer method, soil texture triangle.
6. Limiting Factors: Liebig's Law, Shelford's Law, tolerance ranges, stenohaline/euryhaline, stenothermal/eurythermal.
7. Biotic Components: Producers, consumers, decomposers, trophic levels.
8. Energy Flow: Food chains, food webs, ecological pyramids (energy, biomass, numbers).
9. Biogeochemical Cycles: Carbon cycle, nitrogen cycle, phosphorus cycle, eutrophication.
10. Population Ecology: Population density, dispersion, exponential and logistic growth models.
11. r/K Selection: r-selected vs. K-selected species, life history strategies.
12. Community Ecology: Species dominance, diversity, ecotone, edge effect.
13. Ecological Succession: Primary and secondary succession, pioneer species, climax community.
14. Field Sampling Techniques: Van Dorn sampler, quadrat, transect, soil auger, sample labeling.
15. Conservation & Reporting: Pollution, climate change, biodiversity, scientific report writing.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<ul style="list-style-type: none">- Odum, E. P. Fundamentals of Ecology (5th ed.)- Begon, M., Townsend, C. R., & Harper, J. L. Ecology: From Individuals to Ecosystems (4th ed.)	yes
Recommended Texts	<ul style="list-style-type: none">- Smith, T. M. & Smith, R. L. Elements of Ecology (9th ed.)	yes



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	- Ricklefs, R. E. The Economy of Nature (8th ed.)	
Websites	Khan Academy – Ecology NOAA – Ocean & Climate FAO – Soil & Water Resources	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم		
Strategies	strategy	Description
	Lectures	Interactive PowerPoint presentations with diagrams, animations, and short videos to illustrate key concepts.
	Laboratory Work	Hands-on experiments on measuring abiotic factors, soil texture, water quality, and primary productivity.
	Field Sampling	Field trips to natural ecosystems (e.g., wetlands, rivers) for sample collection using Van Dorn sampler, transects, and soil augers.
	Group Discussions	Student-led discussions on current environmental issues (e.g., climate change, biodiversity loss).
	Problem-Based Learning (PBL)	Case studies on eutrophication, pollution, and conservation planning.
	Scientific Films	Documentaries on ecosystems, nutrient cycles, and human impacts.

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition



Ministry of Higher Education and
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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.

COURSE SCHEDULE: -

Week	hours	Topics Covered	Learning Outcomes
<i>Topic I: Introduction to Ecology</i>			
1	3	<ul style="list-style-type: none">– Definition of Ecology– Levels of Organization– Ecosystem Components	LO1, LO2
<i>Topic II: Abiotic Factors</i>			
2	3	<ul style="list-style-type: none">– Temperature, Light, Water– Wind, Pressure, Soil	LO2, LO3
<i>Topic III: Measurement of Abiotic Factors</i>			
3	3	<ul style="list-style-type: none">– Thermometer, Hygrometer– Barometer, Dew Point Apparatus	LO3
<i>Topic IV: Soil & Water Analysis</i>			
4	3	<ul style="list-style-type: none">– pH, Electrical Conductivity (EC)	LO4



Ministry of Higher Education and
Scientific Research - Iraq
AL Mustaqba University
College of science
Department of biology



		<ul style="list-style-type: none">- Turbidity Measurement (Nephelometer)	
Topic V: Soil Texture Analysis			
5	3	<ul style="list-style-type: none">- Sieve Method- Hydrometer Method	LO5
Topic VI: Limiting Factors			
6	3	<ul style="list-style-type: none">- Liebig's Law- Shelford's Law, Tolerance Ranges- Stenohaline/Euryhaline, Stenothermal/Eurythermal	LO6
Topic VII: Biotic Components & Energy Flow			
7	3	<ul style="list-style-type: none">- Producers, Consumers, Decomposers- Food Chains, Ecological Pyramids	LO7
Topic VIII: Biogeochemical Cycles			
8	3	<ul style="list-style-type: none">- Carbon Cycle- Nitrogen Cycle- Phosphorus Cycle, Eutrophication	LO8
Topic IX: Population Ecology			
9	3	<ul style="list-style-type: none">- Population Density, Dispersion- Exponential & Logistic Growth	LO10
Topic X: r/K Selection			
10	3	<ul style="list-style-type: none">- r-selected Species- K-selected Species	LO9
Topic XI: Community & Succession			
11	3	<ul style="list-style-type: none">- Species Dominance, Diversity- Ecological Succession, Pioneer & Climax Species	LO11
Topic XII: Field Sampling Techniques			
12	3	<ul style="list-style-type: none">- Van Dorn Sampler	LO12



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College of science
Department of biology



		<ul style="list-style-type: none">- Quadrat, Transect, Soil Auger- Sample Labeling & Storage	
Topic XIII: Primary Productivity			
13	3	<ul style="list-style-type: none">- Light & Dark Bottle Method- Chlorophyll Assimilation	LO13
Topic XIV: Human Impacts			
14	3	<ul style="list-style-type: none">- Pollution, Eutrophication- Climate Change, Biodiversity Loss	LO14
Topic XV: Conservation & Reporting			
15	3	<ul style="list-style-type: none">- Protected Areas, Sustainable Development- Scientific Report Writing	LO14, LO15
Final Exam			

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to Lab: Safety, sampling tools, labeling, field forms
Week 2	Measurement of Temperature and Humidity (Wet/Dry Bulb, Dew Point)
Week 3	Measurement of pH and Electrical Conductivity (EC) in soil and water
Week 4	Measurement of Turbidity using Nephelometer
Week 5	Soil Texture Analysis: Sieve Method
Week 6	Soil Texture Analysis: Hydrometer Method
Week 7	Soil Classification using Textural Triangle



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Week 8	Field Sampling: Soil and Water Collection Techniques
Week 9	Dissolved Oxygen (DO) Measurement (Winkler Method)
Week 10	Primary Productivity Estimation (Light & Dark Bottle Method)
Week 11	Nitrogen Cycle Analysis: NO_2^- , NO_3^- Testing in Soil
Week 12	Chlorophyll Assimilation and Productivity Estimation
Week 13	Field Trip: Sampling in a Natural Ecosystem (Van Dorn, Transect)
Week 14	Data Analysis, Report Writing, and Presentation
Week 15	Final Lab Reports Submission and Review

Learning Outcomes and Assessment Methods for "Biochemistry" Course.

Topics Covered	Learning Outcomes	Strategies for Achieving Outcomes	Assessment Methods
Topic I: Introduction & Ecosystems	LO1, LO2	Lectures, Films, Discussions	Quizzes, Written Exam
Topic II : Abiotic Factors	LO2, LO3	Field Work, Lab, PBL	Lab Report, Quiz
Topic III : Soil & Water Analysis	LO4, LO5	Lab Experiments, Research	Lab Report
Topic IV: Limiting Factors	LO6	Lectures, Case Studies	Quiz, Exam
Topic V: Energy Flow	LO7	Diagrams, Case Studies	Homework, Seminar
Topic VI: Biogeochemical Cycles	LO8	Lab, Research	Lab Report, Project
Topic VII: Population Ecology	LO9, LO10	Simulations, Calculations	Assignments, Exam
Topic VIII: Community & Succession	LO11	Field Visit, Group Work	Field Report, Presentation



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AL Mustaqba University
College of science
Department of biology



Topic IX: Field Sampling	LO12	Field Visit, Group Work	Field Report
Topic X: Primary Productivity	LO13	Lab Experiment	Lab Report
Topic XI: Human Impacts	LO14	Debates, Presentations	Essay, Project
Topic XII: Reporting	LO15	PBL, Writing	Final Report

Module Evaluation: -

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment (40%)	Quizzes	3	10% (10)	4,8,12	LO1–LO11
	Assignments	2	10% (10)	6,10	LO6, LO9, LO10
	Projects / Lab.	1	5% (5)	Continuous	
	Seminar	1	5% (5)	14	LO14, LO15
	Field Visits Report	1	5% (5)	13	LO11, LO12
	Discussions During Lectures				
Summative assessment	Midterm Exam (10%)	2 hr	10% (10)	8	LO1–LO8
	Final Exam (50%)	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		