



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 Delivery	
Module Type				✓ Theory ✓ Lecture ✓ Lab ✓ Tutorial ✓ Practical ✓ Seminar	
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 أسبوعياً	



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

### Relation with other Modules:-

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

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>COURSE DESCRIPTION:</b>	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.
<b>Module Aims</b> أهداف المادة الدراسية	<ol style="list-style-type: none"> <li>1- To understand the basic concepts and levels of ecological organization.</li> <li>2- To study the effects of abiotic factors (temperature, light, water, soil) on organisms and ecosystems.</li> <li>3- To analyze energy flow and nutrient cycling (carbon, nitrogen, phosphorus) in ecosystems.</li> </ol>



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	<div>4- To understand population dynamics, growth models (exponential and logistic), and reproductive strategies (r/K selection).</div> <div>5- To explore community ecology, ecological succession, and climax communities.</div> <div>6- To apply practical skills in field sampling, measurement of environmental variables, and laboratory analysis.</div> <div>7- To evaluate human impacts on ecosystems and discuss conservation strategies.</div>	
<div>Module Learning Outcomes</div> <div>مخرجات التعلم للمادة الدراسية</div>	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.
<div>Indicative Contents</div> <div>المحتويات الإرشادية</div>	<div>1. Introduction to Ecology: Definition, levels of organization, biosphere, ecosystem components.</div> <div>2. Abiotic Factors: Temperature, light, water, wind, pressure, soil.</div> <div>3. Measurement of Abiotic Factors: Thermometer, hygrometer, barometer, dew point apparatus.</div> <div>4. Soil &amp; Water Analysis: pH, electrical conductivity (EC), turbidity (nephelometer).</div>	



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



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	- Ricklefs, R. E. The Economy of Nature (8th ed.)	
<b>Websites</b>	<a href="#">Khan Academy – Ecology</a> <a href="#">NOAA – Ocean &amp; Climate</a> <a href="#">FAO – Soil &amp; Water Resources</a>	

### 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
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<b>Success Group (50 - 100)</b>	<b>A – Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C – Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D – Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E – Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 – 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	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
<b>Topic I: Introduction to Ecology</b>			
<b>1</b>	3	<ul style="list-style-type: none"> <li>– Definition of Ecology</li> <li>– Levels of Organization</li> <li>– Ecosystem Components</li> </ul>	L01, L02
<b>Topic II: Abiotic Factors</b>			
<b>2</b>	3	<ul style="list-style-type: none"> <li>– Temperature, Light, Water</li> <li>– Wind, Pressure, Soil</li> </ul>	L02, L03
<b>Topic III: Measurement of Abiotic Factors</b>			
<b>3</b>	3	<ul style="list-style-type: none"> <li>– Thermometer, Hygrometer</li> <li>– Barometer, Dew Point Apparatus</li> </ul>	L03
<b>Topic IV: Soil &amp; Water Analysis</b>			
<b>4</b>	3	<ul style="list-style-type: none"> <li>– pH, Electrical Conductivity (EC)</li> </ul>	L04





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		- Turbidity Measurement (Nephelometer)	
<b>Topic V: Soil Texture Analysis</b>			
<b>5</b>	3	- Sieve Method - Hydrometer Method	LO5
<b>Topic VI: Limiting Factors</b>			
<b>6</b>	3	- Liebig's Law - Shelford's Law, Tolerance Ranges - Stenohaline/Euryhaline, Stenothermal/Eurythermal	LO6
<b>Topic VII: Biotic Components &amp; Energy Flow</b>			
<b>7</b>	3	- Producers, Consumers, Decomposers - Food Chains, Ecological Pyramids	LO7
<b>Topic VIII: Biogeochemical Cycles</b>			
<b>8</b>	3	- Carbon Cycle - Nitrogen Cycle - Phosphorus Cycle, Eutrophication	LO8
<b>Topic IX: Population Ecology</b>			
<b>9</b>	3	- Population Density, Dispersion - Exponential & Logistic Growth	LO10
<b>Topic X: r/K Selection</b>			
<b>10</b>	3	- r-selected Species - K-selected Species	LO9
<b>Topic XI: Community &amp; Succession</b>			
<b>11</b>	3	- Species Dominance, Diversity - Ecological Succession, Pioneer & Climax Species	LO11
<b>Topic XII: Field Sampling Techniques</b>			
<b>12</b>	3	- Van Dorn Sampler	LO12



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

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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





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<b>Week 8</b>	Field Sampling: Soil and Water Collection Techniques
<b>Week 9</b>	Dissolved Oxygen (DO) Measurement (Winkler Method)
<b>Week 10</b>	Primary Productivity Estimation (Light & Dark Bottle Method)
<b>Week 11</b>	Nitrogen Cycle Analysis: $\text{NO}_2^-$ , $\text{NO}_3^-$ Testing in Soil
<b>Week 12</b>	Chlorophyll Assimilation and Productivity Estimation
<b>Week 13</b>	Field Trip: Sampling in a Natural Ecosystem (Van Dorn, Transect)
<b>Week 14</b>	Data Analysis, Report Writing, and Presentation
<b>Week 15</b>	Final Lab Reports Submission and Review

### Learning Outcomes and Assessment Methods for "Biochemistry" Course.

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



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<b>Topic IX:</b> Field Sampling	LO12	Field Visit, Group Work	Field Report
<b>Topic X:</b> Primary Productivity	LO13	Lab Experiment	Lab Report
<b>Topic XI:</b> Human Impacts	LO14	Debates, Presentations	Essay, Project
<b>Topic XII:</b> 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)		