

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN ADVANCED ZOOLOGY**  
**AND BIOTECHNOLOGY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

**SEMESTER -VI**

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
<b>321C6A</b>	<b>ENVIRONMENTAL BIOLOGY</b>	Core	Y	-	-	-	5	6	25	75	100
<b>Learning Objectives</b>											
CO1	To create an awareness to the students about the theories, concepts and basics of Environmental Biology										
CO2	To provide students about the idea of biogeochemical cycles and energy flow in ecosystems										
CO3	To make an awareness of the fresh water habitat and marine habitat										
CO4	To provide adequate explanation to students about the pollutions and population ecology										
CO5	To give an idea about natural resources and conservation.										
UNIT	Details							No. of Hours	Course Objectives		
I	Scope- Concept- Branches in Ecology- Autoecology and Synecology- Micro and Macro environment- Types of media and substratum.  Biosphere- Hydrosphere, Lithosphere, Stratosphere  Abiotic factors-Water, Soil, Light and Temperature  Biotic factors- Animal relationships- Symbiosis, Commensalism, Mutualism, Antagonism, Predation, Parasitism and Competition.							18	CO1		
II	Biogeochemical cycles- Nitrogen, Carbon, Phosphorous and Oxygen cycles- Introduction to the laws of limiting factors-Leibig's law of minimum- Shelford's law of tolerance.  Ecosystem- Pond ecosystem- Energy flow in ecosystem, Pyramid of number, biomass and energy. Food chain-grazing and detritus, Food web and trophic levels.  Terrestrial Ecology- Biomes- Characters- tundra, grassland, forest and desert biomes.							18	CO2		

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III	<p>Fresh Water Habitat- Physico chemical nature of fresh water- Biotic communities- lentic(lakes and ponds) and lotic (river) environment- Stratification of ponds and lakes.</p> <p>Marine Habitat - Characteristics- salinity, temperature, pressure, zonation and stratification- Biotic communities of pelagic, benthic, intertidal (rocky shore, sandy shore and muddy shore) and littoral zones- Coral reefs.</p> <p>Estuarine Habitat – Characteristics- Biotic communities and their adaptations.</p>	18	CO3
IV	<p>Population Ecology- Definition and characteristics: Density, Natality, Mortality, Migration, Emigration and Immigration, Population fluctuation- Age pyramid, growth and growth curve.</p> <p>Community Ecology- Types of communities, characteristics of community, stratification, Ecotone and Edge effect, Ecological niche, Ecological Succession.</p> <p>Environmental Pollution- Air pollution- sources of pollution, Acid rains, ozone, prevention and control of air pollution. Water pollution- sources of pollution and pollutants, prevention and control of water pollution. Land pollution- Solid waste pollution, radioactive pollution, noise pollution, pollution control through law. Green chemistry- Designing of green synthesis- Basic principles of Green Chemistry.</p>	18	CO4
V	<p>Natural resources- Renewable and non-renewable, Concepts of threatened species- red data book- IUCN, WWF protected areas, biosphere reserves, wild life sanctuaries and National Parks- forests in India- desertification- deforestation- carbon dating- Importance of mangroves in coastal ecosystem- Conservation and management.</p>	18	CO5
		<b>90</b>	

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<b>Course Outcomes</b>	On completion of this course, students will;	
<b>CO1</b>	Describe and illustrate the significance of the theories, concepts and basics of Environmental Biology	PO1
<b>CO2</b>	Will be able to relate the factors that are involved in the biogeochemical cycles and energy flow in ecosystems	PO1, PO4
<b>CO3</b>	Correlate the bioresources in fresh water habitat and marine habitat	PO4, PO6
<b>CO4</b>	Know to distinguish between the different types of pollutions and about population ecology	PO4, PO5, PO6
<b>CO5</b>	Update, justify and validate the need for conservation of natural resources	PO3, PO8
<b>Text Books (Latest Editions)</b>		
1.	Colinvaux, P. A. (1993) Ecology (2 <sup>nd</sup> edition) Wiley, John and Sons, Inc.	
2.	Krebs, C. J. (2001) Ecology (6 <sup>th</sup> edition) Benjamin Cummings.	
3	Stiling, P. D. (2012) Ecology Companion Site: Global Insights and Investigations. McGraw Hill Education.	
<b>References Books (Latest editions, and the style as given below must be strictly adhered to)</b>		
1.	Wilkinson, D.M., 2007, Fundamental Processes in Ecology: An Earth system Approach, Oxford University Press, UK.	
2.	Saha, T.K. 2010. Ecology and Environmental biology, Books and Allied, Kolkata.	
3.	Odum, E.P., (2008) Fundamentals of Ecology. Indian Edition. Brooks/Cole.	
<b>Web Resources</b>		
1.	<a href="https://bit.ly/2VYWOM5">https://bit.ly/2VYWOM5</a>	
2.	<a href="https://bit.ly/2VZQFiT">https://bit.ly/2VZQFiT</a>	
3.	<a href="https://bit.ly/3kqdXYA">https://bit.ly/3kqdXYA</a>	
4.	<a href="https://bit.ly/39rvvgt">https://bit.ly/39rvvgt</a>	
<b>Methods of Evaluation</b>		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	75 Marks
	Total	100 Marks

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<b>Methods of Assessment</b>	
<b>Recall (K1)</b>	Simple definitions, MCQ, Recall steps, Concept definitions
<b>Understand/ Comprehend (K2)</b>	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
<b>Application (K3)</b>	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
<b>Analyze (K4)</b>	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
<b>Evaluate (K5)</b>	Longer essay/ Evaluation essay, Critique or justify with pros and cons
<b>Create (K6)</b>	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

**Mapping with Programme Outcomes:**

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>
<b>CO 1</b>	S							
<b>CO 2</b>	M			M				
<b>CO 3</b>				S		S		
<b>CO 4</b>				S	S	M		
<b>CO 5</b>			S					S

**S-Strong(3)    M-Medium (2)    L-Low (1)**