M. G. Science Institute, Ahmedabad

Autonomous | Affiliated to Gujarat University, Ahmedabad

(Managed by the Ahmedabad Education Society)

Department of Zoology

Bachelor of Science (Hons.) in Zoology

(Effective from Academic Year 2026-27)

ZOE 354T: Ecology and Environmental Biology

Semester: V	Course Title:- Ecology and Environmental Biology	Credit: 4
Course No.: 354T	MINOR-4 (T)	Hours: 4/week

Course Outcomes: On successful completion of the course, the learner will be able to:

COs	Cognitive Abilities	Course Outcomes
CO 1	Remembering	Recall concepts of community, succession, ecological factors, ecosystem types, population characteristics, biogeochemical cycles, and environmental issues (greenhouse gases, acid rain, ozone depletion, etc.).
CO 2	Understanding	Explain community stratification, succession processes, ecological adaptations, ecosystem components, interrelationships (mutualism, parasitism, predation, etc.), and causes/effects of global environmental problems.
CO 3	Applying	Identify zonations in marine/terrestrial ecosystems, apply knowledge of food chains & food webs to real examples, and demonstrate conservation practices (soil/forest).
CO 4	Analyzing	Compare hydrosere vs. xerosere succession, analyze population dynamics (size, density, age structure), and examine ecological interactions (competition vs. predation).
CO 5	Evaluating	Assess significance of succession, evaluate effects of eutrophication, biomagnification, and global warming, and judge effectiveness of conservation measures.
CO 6	Creating	Design ecological models of food webs, propose strategies for natural resource management, and create action plans to reduce carbon footprints and mitigate climate change.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	1	2	1	1	1	1	1	1
CO 2	3	2	2	2	2	1	1	2	1
CO 3	3	2		3	2	2	2	2	2
CO 4	3	3	2	2	2	2	1	3	2
CO 5	3	3	3	2	3	2	2	3	3
CO 6	3	3	3	2	2		3	2	3

M.G. Science Institute (Autonomous) B.Sc. (Hons.) Zoology

Unit No.	Unit Contents	No. of Hours of Teaching
1	**Ecology:** **Biotic Community:** • Introducion • Concept of community • Community stratification in terrestrial habitat • Community periodicity **Ecological Succession:** • Causes of succession • Basic types of succession • Process of succession • Pattern of succession-Hydrosere, Xerosere • Climax concept in succession • Significance of Ecological succession.	15
2	**Ecology:** • Ecological factors (Biotic & Abiotic) • Zonations in marine environment • Biological components of ecosystem- Producers, Consumers and Decomposers • Ecological adaptations: Aquatic, Cursorial, Desert, Burrowing, Arborial and Flight • Natural resources and their conservation: - Soil resource -Soil erosion, Soil conservation - Forest resource- Deforestation, Afforestation, Conservation	15
3	**Ecology:** **Ecosystem-Types** • Terrestrial-Forest • Aquatic-Pond, Marine **Food chain & Food webs** **Biogeochemical cycles** • Carbon cycle • Nitrogen cycle • Hydrological cycle • Phosphorus cycle	15

	Population characteristics: • Size and density • Dispersion • Age structure • Natality • Mortality **Interrelationships in animals:** • Commensalism (Remoras and sharks, Cattle egret & cattle) • Mutualism (Coral and algae, Clownfish and anemones) • Parasitism (Ticks on dogs, Fleas on cats, Tapeworms in humans) • Neutralism (Deer and rabbits in a forest, Tarantulas and cacti) • Competition (Lions and leopards, Woodpeckers and squirrels) • Predation (lion hunting a zebra, a snake eating a frog, or a bird catching a fish).	
4	**Environmental biology:** • Greenhouse gases • Green house effects • Global warming • Acid Rain • Ozone layer depletion • Eutrophication • Biomagnification • Carbon footprints	15

Reference books:

Ecology & Environmental biology:

1. Fundamentals of Ecology, P. S. Odum, Saunders.
2. Concepts of Ecology, N. Arumugam, Saras Publication, Nagercoil.
3. Ecology and Environment, P. D. Sharma, Rastogi Publications, Meerut.
4. Ecology, Ricklefs. W. H. Freeman.
5. Concepts of Ecology, 4th Edition, E. J. Kormondy, Prentice-Hall of India.
6. Ecology, M. P. Arora, Himalaya Publishing House
7. Environment and Ecology, Anil kumar De, Arnabkumar De, New Age International Publishers

ZOE 355P: Zoology Minor Practical-355

Semester: V	Course Title:- Zoology Minor Practical-355	Credit: 4
Course No.: 355P	MINOR-5(P)	Hours: 8/week

Course Outcomes: On successful completion of the course, the learner will be able to:

COs	Cognitive Abilities	Course Outcomes
CO 1	Remembering	Recall methods for soil tests (pH, texture, carbonate, water holding), ecological succession stages, marine zonation, biogeochemical cycles, and environmental problems (acid rain, ozone depletion, global warming).
CO 2	Understanding	Explain community stratification, ecological adaptations, ecosystem types, and biological components using charts, specimens, and models.
CO 3	Applying	Perform soil pH and carbonate tests; apply knowledge to identify food chains, food webs, and ecological interactions (mutualism, predation, parasitism).
CO 4	Analyzing	Compare hydrosere vs. xerosere succession; analyze population interactions; examine differences in adaptations (aquatic vs. desert vs. flight).
CO 5	Evaluating	Assess the impact of greenhouse effect, eutrophication, biomagnification, and carbon footprints; evaluate ecosystem functioning and conservation measures.
CO 6	Creating	Construct ecological models of food webs and nutrient cycles; design simple strategies for soil/forest conservation and reducing environmental pollution.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	3	1	2	1	1	1	1	2	1
CO 2	3	2	2	2	2	2	1	1	2
CO 3	3	2	2	3	2	2	2	2	2
CO 4	3		2	2	2	2	1	3	2
CO 5	3	3	3	2	3	2	2	3	3
CO 6	3	3	3	3	3	3	3	3	

No.	Practical
1	Soil -Water Holding capacity (Demonstration only)
2	Soil -Texture analysis (Demonstration only
3	Soil -pH Test
4	Soil- Carbonate Test (Rapid test)
	Study through charts/specimens/models
5	Community stratification in terrestrial habitat
6	Process of succession
7	Succession-Hydrosere, Xerosere
8	Zonation's in marine environment
9	Ecological adaptations (Aquatic, Cursorial, Desert, Burrowing, Arborial, Flight)
10	Ecosystem- Forest, Pond & Marine
11	Biological components of ecosystem
12	Carbon cycle, Nitrogen cycle, Hydrological cycle, Phosphorus cycle
13	Interrelationships in animals (Commensalism, Mutualism, Parasitism, Neutralism, Competition & Predation (eg. as per theory).
14	Food chains and food webs
15	Green house effects and Global warming
16	Acid rain
17	Ozone layer depletion
18	Eutrophication,
19	Bio-magnification
20	Carbon footprints