



**SARVODAYA KELAVANI SAMAJ MANAGED,
SHREE MANIBHAI VIRANI & SMT. NAVALBEN VIRANI SCIENCE
COLLEGE**

AN AUTONOMOUS COLLEGE- AFFILIATED TO SAURASHTRA UNIVERSITY, RAJKOT

Re-accredited at the 'A' Level (CGPA 3.28) by NAAC
'STAR' College Scheme & Status by MST-DBT
A College with Potential for Excellence - CPE (Phase-II) by UGC
UGC-DDU KAUSHAL Kendra
Accredited at the G-AAA Highest Grade 'A-1' Level by KCG, Govt. of Gujarat
UGC-DDU KAUSHAL Kendra
GPCB-Government of Gujarat approved Environment Audit Centre

Enclosure –II

Department: Biology

Programme: **B.Sc. Microbiology**

<i>Semester – IV</i>		
<i>Course Code</i>	<i>Course Title</i>	<i>Credits</i>
22UMBDA401	Zoology– Basics Of Ecology	3 Credits

Course Description:

The course “Zoology– Basics Of Ecology” is specially designed for educating the students about the need to necessity, conservation and protection about ecology and environment and microbial ecology as welfare of human and its future. For enabling the students to understand the roll of ecology in environment, its importance, habitat, interaction, and abiotic component cycle etc. Students can learn the importance of biotic interaction and habitat ecology, its importance and effect on ecology and environment. It enlightens how to maintain and conserve the environment for the future generation. It is also enlightens that what we need to do for our faith, feature and sustainability for the human society and human fate.

Course Purpose:

This course is designed for complete understanding about Ecology, Sustainability of Environment, and human welfare. With this course, the students can understands the needs of Ecology and Environment conservation. The goal of the course is to inspire the

knowledge across habitat ecology, community dynamics and its interactions, Biogeochemical cycles and also about microbial ecology. By this course students get the complete awareness regarding the Ecology, Sustainable living and care of Environment and conservation of biodiversity.

Course Outcomes: Upon completion of this course, the learner will be able to

CO No.	CO Statement	Blooms taxonomy Level (K₁ to K₆)
CO ₁	<i>Describe a basic knowledge and understanding on Origin of Life, Structure, functions and types of Ecology. Also describe all about some abiotic factors.</i>	K1 and K2
CO ₂	<i>Illustrate complete information about Habitat ecology, Terrestrial and aquatic environment, Atmosphere, Air and gases. It also illustrate how the habitat loss is occurs.</i>	K2 and K3
CO ₃	<i>Develop understanding and functioning of population and community for the environment, interaction among community and environment, trance formation of environmental condition.</i>	K2 and K1
CO ₄	<i>Observe identification and effects of Biogeochemical cycles and its importance and maintenance.</i>	K1 and K2
CO ₅	<i>Illustrate Microbial ecology including soil and Aero-micro flora and its interaction with the biotic components and significance with human society.</i>	K3 and K3

Course Content	Hours
Unit -I: Introduction to Ecology	9Hrs
<ul style="list-style-type: none"> • History, basic concepts and scopes • Chemical evolution for the Origin of life. • Biological evolution for the Origin of life. • Ecosystem – structure, function and types • Abiotic factors – Water, Light, Temperature 	
Unit-II Habitat Ecology	9 Hrs
<ul style="list-style-type: none"> • Terrestrial Habitat – Soil formation, constituents, types, profile, soil erosion. • Aquatic Habitat – Types, Stratification and Zonation. • Atmosphere – Structure and Stratification. • Air and Gases, Aerosol. • Habitat loss - Causes and Effects. 	

Unit- III Community and interaction	9 Hrs
<ul style="list-style-type: none"> • Population Dynamics – Size, Frequency, Density, Abundance. • Population Natality, Mortality, Dispersion and Age structure. • Community - Composition, Structure, Quantitative characters, Qualitative characters. • Interaction – Mutualism, Commensalism, Antagonism, competition. • Succession – Introduction, General process, Cause, types, Hydrosere, Lithosere. 	
Unit- IV Biogeochemical Cycles	9 Hrs
<ul style="list-style-type: none"> • Gasses cycle - Carbon cycle • Effect at high concentration Green House Gases - <ul style="list-style-type: none"> 1. Nitrogen cycle 2. Oxygen cycle 3. Hydro cycle • Sedimentary Cycle - Sulphur cycle. • Human impact of biogeochemical cycle - Phosphorous cycle. 	
Unit-V Microbial Ecology	9 Hrs
<ul style="list-style-type: none"> • History and development, Major contribution • Soil as habitat natural habitat, Soil microflora • Airo microflora and Microb dispersal • Microbiomics reference to Human. • Micro Interaction – with Microb, Plant and Animal. 	

Text Books:

- *Arumugam, Concepts of Ecology, seventh edition, 2010, Saras publication.*
- *Verma, P. S., & Agarwal, V. K. (2015). Environmental Biology: Principles of Ecology., S. Chand publication, New Delhi.*

Reference Books:

- *Odum, E. P., & Barrett, G. W. (1971). Fundamentals of ecology. Philadelphia: Saunders.*
- *Groom, M. J., Meffe, G. K., & Carroll, C. R. (2006). Principles of conservation biology, Sunderland: Sinauer Associates publishing.*

Zoology – Practical**Semester – IV**

Course Code	Course Title	Hrs/Week	Credits
22UMBDA402	Zoology– Basics Of Ecology Practicals	6 Hrs/Week	2 Credits

Course Description:

The practical course is framed to give sound knowledge with understanding of “Zoology – Basics Of Ecology”. This course is specially designed for enable the students to understand the roll of ecology in environment, its importance, future necessity and control of pollution by practical works. It enlightens how each group of organisms are interact and include themselves in the environment with their special characteristics and how they maintain the ecosystem. it also give understanding regarding their Ecological adaptations. It also deals with the Community dynamics and Bio-statistics, too.

Practical work of this course also give perfection regarding to the Titration method.

Course Purpose:

This course practical work is in the laboratory to study through performing work, Field work, Specimens, Multimedia, Generating statistical data, Titration method etc. They gain introductory experience in appalling each of the following skills and gain greater proficiency in the selection of them depending on their practicals.

- *To develop understanding on the Aquatic ecosystem.*
- *Understand basics of Chemical Characters of Soil.*
- *Develop understanding on Animal interaction and Ecological Adaptations.*
- *Acquire knowledge of Water properties by Titration method.*
- *Apply the principals of Community dynamics.*
- *Develop the skill to understand Stastical-data analysis.*

Course Outcomes: *Upon completion of this course, the learner will be able to*

CO No.	CO Statement	Blooms taxonomy Level (S₁ to S₆)
CO ₁	<i>Perform and observe Soil chemical characteristics and understand Aquatic ecosystem.</i>	S ₃
CO ₂	<i>Understand water properties like Clorinity, Carbondioxide content, Hardness, BOD and COD etc. through performance of Estimation or Measurement by Titration method.</i>	S ₁
CO ₃	<i>Observe, Identify and Understand Biotic interaction and ecological adaptations.</i>	S ₁ & S ₃
CO ₄	<i>Study and perform Population and Community dynemics.</i>	S ₄ & S ₆
CO ₅	<i>Demonstrate and observe Bio-statistics and habitat ecology.</i>	S ₂ & S ₃

Practicals

1. *Study of Aquatic ecosystem*
 - a. *Pond ecosystem*
 - b. *Oceanic Zonation*
2. *To Compare the chemical characteristics of soil - I*
 - a. *pH*
 - b. *Moisture content*
3. *To Compare the chemical characteristics of soil - II*
 - a. *Carbonate content*
 - b. *Nitrate content.*
4. *Estimation of Chlorinity in water.*
5. *Estimation of carbon dioxide in tap water.*
6. *Measurement of water quality, based on Hardness.*
7. *Measurement of water quality, based on BOD and COD.*
8. *Study of Biotic-interaction.*
9. *Study of Ecological adaptation part I.*
10. *Study of Ecological adaptation part II.*
11. *To determine 'species Area curve' and community size by quadrat method.*
12. *To determine Frequency of the community by quadrat method.*
13. *To determine Density of the community by quadrat method.*
14. *To determine Abundance of the community by quadrat method.*
15. *To determine population strength by quadrat method.*
16. *To calculate Median for community dynamics.*
17. *To calculate Mode for community dynamics.*
18. *To calculate Mean for community dynamics.*
19. *To determine Water holding capacity of the soil from different soil samples.*
20. *To count planktonic population among polluted water.*
21. *Study of Marine Habitat and stratification.*
22. *Habitat study of Desert Area, Forest Area, Fresh water Area.*

Reference books

- *Verma, P.S., Agrawal, V.K. (2005). Ecology, Cell Biology, Molecular Biology, Genetics. New Delhi: S. Chand and Company Limited.*
- *Lal S. S., Practical book of Chordate., 2014, Rastogi publication, Meerut .*

- Jaysurya, Arumugam A., *Zoology Practical*, 2015, Saras Publication, South India.

Pedagogic tools:

- Chalk and Board
- Power point presentation
- Seminar
- Videos
- By field visit
- e-learning – Facebook page Royal Botany
- By models, specimens, charts, permanent slides
- By workshop

Methods of Assessment & Tools:

Components of CIE: 30 marks : Theory:

Sr. No.	Component	Content	Duration (if any)	Marks	Sub Total
A	Test 1	1 st 2 units	1 ^{1/2} hours	5 (Set for 30)	20
	Test 2	All 5 units	3 hours	15 (Set for 70)	
B	Assignment			05 (Set for 20)	10
C	Class activity			05 (Set for 20)	
Grand Total					30
Assignment		<ul style="list-style-type: none"> • Question answer • Student generated hand book • Essay writing • Case study • Abstract and exclusive study • Power presentation • Chart/model • Poster • Herbarium preparation 			
Class activity		<ul style="list-style-type: none"> • Quiz • One minute game on the base of the topic • Group discussion, • Student talk, etc... 			

Components of CIE: 30 marks : Practical:

Sr. No.	Component	Content	Duration (if any)	Marks	Sub Total
A	Test	60% of Practical course	2 hours	15 (Set for 30)	15
B	Observation books and record	All Practicals	-	05 (Set for 05)	5
Grand Total					20