



**TEACHING PLAN: Environmental Biology & Ethology**

<b>SCHOOL: SCHOOL OF BASIC &amp; APPLIED SCIENCES (SOBAS), RAFFLES UNIVERSITY</b>			
<b>ACADEMIC SESSION:</b>		<b>FOR STUDENT'S BATCH: B.Sc. (CBZ) III Year (VI- Semester)</b>	
<b>2021 – 2024 &amp; 2022-25</b>			
<b>1</b>	<b>Course No.</b>	ZOO - 302	
<b>2</b>	<b>Course Title</b>	Environmental Biology & Ethology	
	<b>Credits</b>	<b>3</b>	
<b>4</b>	<b>Learning Hours</b>	<b>Contact Hours</b>	<b>44</b>
		<b>Assessment</b>	<b>18</b>
		<b>Guided Study</b>	<b>28</b>
		<b>Total hours</b>	<b>90</b>
		<b>3 lectures per week</b>	

<b>5</b>	<b>Course Objective</b>	<ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of the environment, including the global environment, hydrosphere, lithosphere, and atmosphere.</li> <li>2. Analyze the present status and future needs of natural resources, emphasizing the conservation and management of both renewable (forest, wildlife, water) and non-renewable resources (soil, minerals, and energy).</li> <li>3. Evaluate wildlife conservation efforts, identifying vanishing and threatened animals and plants in Rajasthan. Examine the role of Government and Non-Government Organizations, including wildlife Acts, in wildlife management.</li> <li>4. Recognize the different types of environmental pollution, including water, air, and soil pollution. Explore the sources and remedies for various pollutants such as noise, radiation, industrial chemicals, agrochemicals, insecticides, and household pollutants.</li> <li>5. Investigate global environmental issues, including the greenhouse effect, ozone layer depletion, El-Nino and La-Nino effects, fallout effects of radiation, and nuclear accidents.</li> <li>6. Explore advanced concepts such as bioaccumulation, biomagnification, and biodegradation of pollutants. Analyze the impact of urbanization, including the development and distribution of urban centers. Examine factors, problems, and solutions related to urbanization. Additionally, gain a brief understanding of the human population in India and Rajasthan.</li> <li>7. Study space ecology, focusing on space ecosystems, associated problems, and potential solutions, including the concept of colonization.</li> <li>8. Examine the history and introduction of Ethology as a scientific discipline.</li> <li>9. Understand key concepts in Ethology, such as fixed action patterns, sign stimuli, innate learning mechanisms, motivation, imprinting, and learning.</li> </ol>
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		<p>10. Investigate the role of pheromones in alarm spreading among animals.</p> <p>11. Explore societal structures in animals, with a specific emphasis on characteristics and advantages, using examples like honey bees and monkeys.</p> <p>12. Examine biological rhythms and clocks governing animal behavior.</p> <p>13. Understand various methods employed in the study of animal behavior.</p>
6	Course Outcomes	<p>1. Demonstrate a comprehensive understanding of environmental concepts, including the global environment, hydrosphere, lithosphere, and atmosphere.</p> <p>2. Evaluate the status and future needs of natural resources, with a focus on conservation and management strategies for both renewable (forest, wildlife, water) and non-renewable resources (soil, minerals, and energy).</p> <p>3. Assess wildlife conservation efforts, identifying and analyzing vanishing and threatened animals and plants in Rajasthan. Examine the role of governmental and non-governmental organizations, including relevant wildlife Acts, in wildlife management.</p> <p>4. Analyze various types of environmental pollution (water, air, soil) and propose sources and remedies for noise, radiation, industrial chemicals, agrochemicals, insecticides, and household pollutants.</p> <p>5. Investigate global environmental issues, including the greenhouse effect, ozone layer depletion, El-Nino and La-Nino effects, fallout effects of radiation, and nuclear accidents.</p> <p>6. Understand advanced ecological concepts such as bioaccumulation, biomagnification, and biodegradation of pollutants. Analyze the impact of urbanization, including the development and distribution of urban centers, and comprehend factors, problems, and solutions related to urbanization.</p>

7. Outline syllabus:						
7.01	Paper Code	Unit	Introduction	Reference number	Teaching methods	
	Paper Code: ZOO-302	I	<p>1. Environment and its concepts, global environment, hydrosphere, lithosphere and atmosphere</p> <p>2. Natural resources; present status and future needs, conservation and management of natural resources; renewable (forest, wildlife, water) and non renewable (soil, minerals and energy)</p> <p>3. Wildlife conservation; vanishing and threatened animals and plants in Rajasthan, wildlife management efforts by Government and Non government organizations (including wildlife Acts)</p>		<p>Providing them notes, elucidating all processes and mechanisms on a whiteboard, and conveying information through presentations (PPT) and videos.</p>	

		II	<ol style="list-style-type: none"> <li>1. Environmental pollution; general outline and various types of pollution (water, air, and soil), Sources and remedies for noise, radiation, industrial chemicals, agrochemicals, insecticides, pesticides, and household pollutants</li> <li>2. Greenhouse effect, ozone layer depletion, El-Nino and La-Nino effects, fallout effects of radiation, nuclear accidents</li> <li>3. Basic concepts of bioaccumulation, biomagnification, biodegradation of pollutants</li> </ol>		-----do-----
		III	<ol style="list-style-type: none"> <li>1. Impact of urbanization; development and distribution of urban centers, factors, problems and solutions of urbanization, brief idea of human population of India and Rajasthan</li> <li>2. Space ecology; space ecosystem, space problems and their solutions, colonization</li> </ol>		-----do-----
		IV	<ol style="list-style-type: none"> <li>1. Introduction and history of Ethology</li> <li>2. Concepts of Ethology; fixed action pattern, sign stimulus, innate learning mechanism, motivation, imprinting and learning</li> <li>3. Pheromones and their role in alarm spreading</li> <li>4. Societies; characteristics and advantage with special reference to honeybee, and monkey</li> <li>5. Biological rhythms and biological clocks</li> <li>6. Methods of studying animal behaviour</li> </ol>		-----do-----
8.	Course Evaluation				
8.1	CA: 20%				
8.2	Attendance	5			
8.3	Homework	-			
8.4	Quizzes	5			
8.5	Projects	-			
8.6	Presentation	10			
8.7	Any other	-			

8.2	MTE	20%
8.3	End-term examination	60%
9.	Textbooks & References	
9.1	Textbook	-
9.2	References	Calver, M., & Lymbery, A. (Eds.). (2009). Environmental biology. Cambridge University Press. Woodward, F. I., & Sheehy, J. E. (2017). Principles and measurements in environmental biology. Elsevier. Immelmann, K. (2012). Introduction to ethology. Springer Science & Business Media. Moreno, C. B., & Muñoz-Delgado, J. (2007). An account on the history of ethology. Suma Psicológica, 14(2), 213-224.
9.3	Video References	<a href="https://youtu.be/gnzpeJGgPXA?si=KG56EyC6Qg4Tr7HZ">https://youtu.be/gnzpeJGgPXA?si=KG56EyC6Qg4Tr7HZ</a> <a href="https://www.youtube.com/live/Ve9mlAUx6pE?si=A5AS2CWde6joeUP2">https://www.youtube.com/live/Ve9mlAUx6pE?si=A5AS2CWde6joeUP2</a> <a href="https://www.youtube.com/live/p3cVMzWq6eE?si=quVN1Q_-Zt3376R">https://www.youtube.com/live/p3cVMzWq6eE?si=quVN1Q_-Zt3376R</a> <a href="https://youtu.be/ISVaoLIW104?si=2SFals7bmhixG_D">https://youtu.be/ISVaoLIW104?si=2SFals7bmhixG_D</a>

Practical's: Zoology Lab - VI

(6 labs per week)

Outcome	Unit 1	Unit 2	Unit 3	Unit 4
1	✓	✓	✓	✓
2	✓	✓		
3	✓			
4	✓	✓	✓	
5	✓	✓		
6	✓		✓	

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### *Question Bank*

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1. What are the fundamental concepts related to the environment?
2. Explain the components of the hydrosphere, lithosphere, and atmosphere.
3. Evaluate the current status and future needs of renewable resources.
4. Discuss conservation and management strategies for non-renewable resources.
5. Identify and analyze vanishing and threatened animals and plants in Rajasthan.
6. Describe the role of governmental and non-governmental organizations in wildlife management, including relevant wildlife Acts.
7. What are the various types of environmental pollution?
8. Provide sources and remedies for noise pollution.
9. Explain the impacts of the greenhouse effect and ozone layer depletion.
10. Investigate global environmental issues such as El-Nino, La-Nino effects, fallout effects of radiation, and nuclear accidents.
11. Define bioaccumulation, biomagnification, and biodegradation of pollutants.
12. Analyze the impact of urbanization on the development and distribution of urban centers.
13. Discuss the factors, problems, and solutions related to urbanization.
14. Provide a brief idea of the human population of India and Rajasthan.

15. Describe the concepts of space ecology, space ecosystem, and space problems.
16. Discuss the introduction and history of Ethology.
17. Explain the concepts of Ethology, including fixed action patterns, sign stimulus, innate learning mechanisms, motivation, imprinting, and learning.
18. Explore the role of pheromones in alarm spreading.
19. Describe the characteristics and advantages of societies with special reference to honeybees and monkeys.
20. Explain biological rhythms and biological clocks.
21. Describe the methods of studying animal behavior.
22. Discuss the significance of biological rhythms and biological clocks.
23. Explain the characteristics and advantages of societies with special reference to honeybees and monkeys.
24. Discuss the history and concepts of Ethology, including fixed action patterns, sign stimulus, and innate learning mechanisms.
25. Describe the role of pheromones in alarm spreading.

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***PROJECTS (To be given to group of students)***

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**1. Wildlife Conservation Database and Awareness Campaign:**

- Develop a comprehensive database highlighting vanishing and threatened animals and plants in Rajasthan.
- Create an awareness campaign using multimedia (videos, posters, social media) to educate the public about wildlife conservation efforts, including the role of governmental and non-governmental organizations and relevant wildlife Acts.

**2. Environmental Impact Assessment Toolkit:**

- Design an interactive toolkit for assessing the environmental impact of human activities, focusing on pollution sources and remedies for noise, radiation, industrial chemicals, agrochemicals, insecticides, pesticides, and household pollutants.
- Include practical solutions and recommendations for minimizing environmental impact.

**3. Global Environmental Issues Webinar Series:**

- Organize a series of webinars addressing global environmental issues such as the greenhouse effect, ozone layer depletion, El-Nino and La-Nino effects, fallout effects of radiation, and nuclear accidents.
- Invite experts to present and discuss these topics, fostering a deeper understanding of the challenges and potential solutions.

**4. Urbanization and Sustainable Development Case Studies:**

- Conduct case studies on the impact of urbanization, including the development and distribution of urban centers.
- Analyze factors, problems, and solutions related to urbanization, and propose sustainable development strategies for both urban and rural areas.

**5. Animal Behavior Research and Documentation Project:**

- Undertake a research project on animal behavior, focusing on concepts such as bioaccumulation, biomagnification, and biodegradation of pollutants.
- Document animal behavior in different environments, considering biological rhythms, biological clocks, and the impact of human activities on wildlife behavior.