

<b>Course Title:</b> Introduction to Environmental Biology				
<b>Course code:</b> UES 104	<b>No. of credits:</b> 3	<b>L-T-P:</b> 37-8-0	<b>Learning hours:</b> 45	
L: Lectures; T: Tutorials; P: Practicals				
<b>Pre-requisite course code and title (if any):</b> None				
<b>Department:</b> Natural and Applied Sciences				
<b>Course coordinator:</b>		<b>Course instructor:</b>		
<b>Contact details:</b>				
<b>Course type:</b> Major		<b>Course offered in:</b> Semester 2		
<b>Course Description</b> This course aims to introduce students to the basic and advanced concepts of biology in the context of environmental sciences. It includes an overview of biological classifications and delves into the structure and function of plants and the various physiological processes in plants. The course also explores the emerging field of environmental genomics and its applications in biodiversity conservation and climate change mitigation.				
<b>Course objectives</b>				
<ul style="list-style-type: none"> <li>• To provide an in-depth understanding of the biological classifications of living organisms, including recent advancements and debates.</li> <li>• To explore the structure, functions, and adaptations of plants and animals in different environmental contexts.</li> <li>• To introduce students to environmental genomics, including its role in addressing global environmental challenges</li> </ul>				
<b>Course content</b>				
Module	Topic	L	T	P
1	<b>Taxonomy and Biological Classifications</b>			
	This module introduces to the classification of biological system and the scientific nomenclature. Taxonomic classification and nomenclature; biological classification: five kingdoms (emphasis on plant and animal kingdom).	4		
2	<b>Plant Physiology</b>			
	This module delivers in detail the physiology of plants that includes the water and nutrient uptake and the various metabolism processes. The concepts to be discussed under this module include:			
	Plant-Water relations: mechanism of stomatal movement; water and nutrient uptake; transpiration.	3	2	
	Photosynthesis: mechanisms and environmental influences; respiration in plants; nitrogen metabolism; biological nitrogen fixation, ammonia assimilation.	4		
	Plant growth regulators: mechanism and role in plant growth and adaptations, plant responses to environmental stresses; physiology of flowering.	4		
3	<b>Animal Physiology</b>			
	Concepts of enzymes, membranes, transport; metabolism and thermoregulation; animal response to environmental changes.	4		
4	<b>Environmental Biotechnology</b>			
	This module focuses on introducing the students to basics of biotechnology, along with delivering in-depth knowledge of biotechnological applications to environmental remediation. The focus areas covered under this module are:			
	Introduction to environmental biotechnology; concepts of biotechnological processes.	3		
	Bioreactors: types and designing.	3	2	
	Application of biotechnology in agriculture and environmental remediation.	4	2	

5	<b>Basics of Environmental Genomics</b>			
	The module will be introducing the students to genetics and genomics. Through this module, the students will learn about the functioning and composition of the single gene as well as all genes and their inter-relationships, combinedly influencing the growth and development of organisms. The contents of this module are as follows:			
	Concepts of genetics; population genetics and species interactions; gene expression.	4		
	Introduction to genomics and environmental DNA; application of environmental genomics in conservation biology, climate change studies, remediation studies; case studies.	4	2	
	<b>Total</b>	37	8	
<b>Evaluation criteria</b>				
<ul style="list-style-type: none"> <li>• Minor Test 1: Written test [at the end of teaching of module 2] - 20%</li> <li>• Minor Test 2: Written test [at the end of teaching of module 3] - 20%</li> <li>• Major Test: Written test [at the end of the semester, full syllabus] - 40%</li> <li>• Assignments: 20%</li> </ul>				
<b>Learning outcomes</b>				
Upon completion of the course, the students will be able to:				
<ul style="list-style-type: none"> <li>• Understand the basic concepts and principles in different branches of biology like taxonomy, plant physiology, animal physiology, biotechnology, and genomics. [Test 1, Test 2, Tutorials/Assignments, Major Test]</li> <li>• Realize the application of principles of biology in solving major environmental issues. [Test 2, Tutorials/Assignments, Major Test]</li> </ul>				
<b>Pedagogical approach</b>				
<ul style="list-style-type: none"> <li>• The course will be delivered through lectures and tutorials that focus on developing a clear foundation of the core concepts of environmental biology and genomics.</li> <li>• The course will also focus on classroom discussions, practical and assignments aimed at understanding the living organisms and life processes.</li> </ul>				
<b>Reading resources</b>				
<ul style="list-style-type: none"> <li>• Cutter, E. G. (1969). <i>Plant Anatomy; Experiment and Interpretation: Cells and tissues</i>. United Kingdom: Edward Arnold.</li> <li>• Vashishta, P.C. (1997). <i>Plant Anatomy</i>. Pradeep Publications.</li> <li>• Verma, S.K and Verma, M (2008). <i>A Textbook of Plant Physiology, Biochemistry and Biotechnology</i>. S. Chand Publishing.</li> <li>• Verma, V. (2007). <i>Textbook Of Plant Physiology</i>. India: Ane Books India.</li> <li>• Snustad, D. P., &amp; Simmons, M. J. (2015). <i>Principles of genetics</i>. John Wiley &amp; Sons.</li> </ul>				
<b>Student Responsibilities</b>				
The students are required to come prepared with readings that are suggested during the class and ensure timely submission of assignments. They are also expected to participate and further strengthen their understanding of concepts through practical sessions and classroom discussions.				

**Course Designed by:**

- Dr. Sayantee Roy, Assistant Professor, Department of Natural and Applied Sciences, TERI School of Advanced Studies, New Delhi

**Course Reviewers:**

The course is reviewed by the following reviewers:

- Dr. Indu Shekhar Thakur, (Retd. Professor & Former Dean), School of Environmental Sciences, Jawaharlal Nehru University, New Delhi.
- Dr. Vandana Mishra, Professor, Department of Environmental Studies, University of Delhi.