

<b>Course title:</b> Biodiversity Assessment and Conservation				
<b>Course code:</b> NRE 123	<b>No. of credits:</b> 3	<b>L-T-P:</b> 20-15-20	<b>Learning hours:</b> 45	
<b>Pre-requisite course code and title (if any):</b> NRE 121 Ecology				
<b>Department:</b> Energy and Environment				
<b>Course coordinator:</b>		<b>Course instructor:</b> Dr Sudipta Chatterjee		
<b>Contact details:</b> s.chatterjee@terisas.ac.in				
<b>Course type:</b> Elective		<b>Course offered in:</b> Semester 2		
<b>Course Description</b> The aim of the course is that the students understand biodiversity in the context of ecosystem dynamics, ecosystem functioning and provision of ecosystem services. Students will know how to assess biodiversity with different methodologies and they will be able to conduct a critical analysis of measures to manage biodiversity.				
<b>Course objectives</b> 1. Understanding the basics of science of biodiversity in an ecological context 2. Learning tools and techniques relevant to monitoring of biological diversity 3. Ability to design a field based project with rationale and appropriate methodology.				
<b>Course content</b>				
<b>Module</b>	<b>Topic</b>	<b>L</b>	<b>T</b>	<b>P</b>
1.	<b>Refreshing basic ecology important for biodiversity</b> Origin of species, succession, disturbances	2		
2.	<b>Introduction</b> Definition of biodiversity, clarification of terms (taxonomic, spatial levels, endemism), levels of biodiversity (microbial, genetic, species, ecosystem, landscape), drivers of biodiversity,	1		
3.	<b>Magnitude and Distribution of biodiversity</b> Evolution of biodiversity, overview of ecological communities, number of species worldwide, change in biodiversity over time in different regions of the world, concept of diversity hot-spots; Biodiversity in India: In the past and present. Global distribution of biodiversity (latitudinal diversity gradient).	2	2	
4.	<b>Assessment and Monitoring of biodiversity</b> Indicators for Biodiversity. Methodology of assessment and analysis of different species groups, monitoring of different species groups, Fieldwork on different plant communities with simple sampling methods and analysis Presenting and discussion of results	5	2	8
5.	<b>Biodiversity–ecosystem functioning–Ecosystem Services (ES)</b> Ecosystem functions related to biodiversity, definition of ES, importance of biodiversity ecosystem functioning for supply of ES (direct and indirect), methods of valuation	2		
6.	<b>Biodiversity loss and its consequences</b> Estimates of extinction rates worldwide and in India, Analysing and discussion of causes and extinction/changes in biodiversity, Summarising causes and consequences (Causes: Vulnerability to extinction; changing of the environment (Habitat fragmentation and destruction) climate change, overexploitation; Consequences: loss of gene pool, loss of ecosystem services, livelihood)	2		

7.	<p><b>Conservation strategies</b>  Theoretical background: overview of genetic variability: population biology of endangered species, conservation genetics, wildlife biology  Ex-situ conservation: (facilities, establishment of new populations, captive breeding, reintroduction, discussion of advantages and disadvantages,  Field trip (Delhi Zoo)  In-situ conservation: (assessment of adequate areas, design and management of protected areas; problems protected areas in India, connectivity and corridors, sustainable use of biodiversity, conservation and society, conservation networks  Tutorial on Kaimowitz and Sheil (2007)</p>	4	1	4
8.	<p><b>Biodiversity restoration</b>  Principles, definitions, degradation, tools and methods, restoration and ecosystem functioning, discussion of case studies</p>	2	2	
9.	<p><b>Excursion to biodiversity hotspot</b>  An area in India where biodiversity issues can be studied will be visited. The students work in group of 2-3 on small studies (preparation, assessment, analysis). The topics for the studies are chosen the ongoing public discussion on biodiversity (Man-animal conflict, human interference, climate change, policy)  Preparation  Analysis  Field trip (10 days)</p>			4 4
10.	<p><b>Workshop</b>  Students will present and discuss the findings of their studies work on different aspects of the biodiversity of the hotspot visited</p>		8	
	<b>Total</b>	20	15	20
<p><b>Evaluation criteria</b></p> <ul style="list-style-type: none"> <li>▪ Test 1: 20%</li> <li>▪ Assignment: 20%</li> <li>▪ Presentation: 20%</li> <li>▪ Test 3: 40%</li> </ul>				
<p><b>Learning outcomes</b></p> <p><b>Test 1:</b></p> <ul style="list-style-type: none"> <li>• Students are able to interpret basics of science of biodiversity conservation covered in Modules 1-3.</li> </ul> <p><b>Assignment:</b></p> <ul style="list-style-type: none"> <li>• Students are able to implement a small project on monitoring of biodiversity</li> </ul> <p><b>Presentation</b></p> <ul style="list-style-type: none"> <li>• Students have developed skills to articulate their findings.</li> </ul> <p>Test 3:  Students are able to synthesise learnings from all the modules entire semester.</p>				
<p><b>Pedagogical approach: Class room teachings, class room workshops and discussions on emergent biodiversity conservation issues, biodiversity monitoring techniques</b></p>				
<p><b>Materials</b></p> <p><b>Modules 1 and 2 Refreshing basic ecology important for biodiversity</b></p> <ol style="list-style-type: none"> <li>1. Primack R.B. (2006) <i>Essentials of Conservation Biology</i> (4th ed.), Sinauer Associates, Sunderland.</li> <li>2. Origin of Species. Charles Darwin.</li> <li>3. Ecology by C. Krebs.</li> </ol>				

**Module 3: Magnitude and distribution of biodiversity.**

1. Research papers on Biodiversity ‘Hotspot’ by Norman Myers.
2. WWF Terrestrial Ecoregions.
3. The Living planet index.

**Module 4: Assessment and Monitoring of Biodiversity.**

1. Ecological Diversity and Measurement by Magurran, A.E. Princeton University Press. New Jersey.

**Module 5: Biodiversity – Ecosystem Services.**

1. Research papers by Balvanera and Neem.
2. Millennium Ecosystem Assessment Report, 2005.

**Module 6:**

1. Research papers by Krishtalka and Peterson, Kansas University, US, and on Biodiversity Informatics. .
2. The Sixth Extinction by Elizabeth Kolbert.
3. Sustaining Life by Eric Chivian.

**Module 7: Conservation Strategies:**

1. Planning a protected area network in India by Allna Rodgers and H S Pawar. Wildlife Institute of India.
2. Saharaia V.B. (2001) *Wildlife in India*, Natraj Publishers, Dehra Dun.

**Module 8: Biodiversity Restoration”.**

1. Papers by Society for Ecological Restoration, Australia. Research papers by IIT-ISM, Dhanbad, J.S Singh.

**Module 9: Excursion to biodiversity ‘hotspot’.** Readings on the landscape visited.

## Additional Readings

1. Grimmett R., Inskipp C. and Inskipp T. (2001) *Pocket Guide to the Birds of the Indian Subcontinent*, Oxford University Press, Oxford.
2. Krishen P. (2006) *Trees of Delhi: A Field Guide*, Dorling Kindersley, New Delhi.

## Journals

1. Biological Conservation
2. Conservation Biology
3. International Journal of Biodiversity and Conservation

**Advanced Reading Material: To be provided.**

**Additional information (if any):** This course is a prerequisite to course NRE 151 Wildlife Conservation and Management.

**Student responsibilities**

The students are expected to submit assignments in time and come prepared with readings when provided

**Course reviewers**

1. Priya Davidar, Dean, School of Life Sciences, Pondicherry University.
2. Prof. Jürgen Bauhus, Director of the Institute for Silviculture, University of Freiburg, Germany.
3. Jean P. Puyravaud, ECOS-Director, Guest Faculty, School of Life Sciences, University of Pondicherry.