

<b>Course title:</b> Earth system sciences				
<b>Course code:</b> NRC 136		<b>No. of credits:</b> 3	<b>L-T-P:</b> 42-0-0	<b>Learning hours:</b> 42
<b>Pre-requisite course code and title (if any):</b> None				
<b>Department:</b> Department of Energy and Environment				
<b>Course coordinator(s):</b> Dr. Chubamenla Jamir			<b>Course instructor(s):</b> Dr. Chubamenla Jamir	
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<b>Course type:</b> Compulsory Core		<b>Course offered in:</b> Semester 1		
<b>Course description</b> The purpose of the course is to develop a holistic understanding of Earth's system. Earth System Science is inherently interdisciplinary in scope, linking oceanography, atmospheric and terrestrial sciences, climatology, hydrology, biology, physics, and chemistry to understand the environment and climate. After the course, the students will be able to appreciate the importance of taking a systemic approach in understanding the earth system and for management of different earth components, natural resources and climate.				
<b>Course objectives</b>				
<ul style="list-style-type: none"> <li>▪ To understand the basic principles of Earth's system, its various components and the inter-linkages between these components.</li> <li>▪ To understand how the interplay between various earth's spheres influences climate.</li> </ul>				
<b>Course content:</b>				
<b>Module</b>	<b>Topic</b>	<b>L</b>	<b>T</b>	<b>P</b>
1.	Overview; Systems approach to understand and analyze environmental systems; Sustainability and challenges	2		
2.	<b>Ocean</b> Marine food and economic resources; sustainability issue; distribution of temperature and salinity; ocean currents; ocean and climate	5		
3.	<b>Climate</b> Temperature and pressure belts of the world; Heat budget of the earth; Atmospheric circulation; atmospheric stability and instability. Air masses and fronto-genesis, Temperate and tropical cyclones; Climatic regions; Global climatic change and role and response of man in climatic changes	6		
4.	<b>Biogeography</b> Genesis, classification and distribution of soils; Factors influencing world distribution of plants and animals; conservation measures; Sustainability issues.	5		
5.	<b>Earth dynamism</b> Earth's interior; Geosynclines; Plate tectonics; mountain building; Volcanicity; Earthquakes and Tsunamis, management of natural disasters.	4		
6.	<b>Human population</b> Growth and distribution of world population; demographic attributes; concepts of over-under-and optimum population; Population theories, Regional planning and planning for sustainable development.	5		
7.	<b>India's environmental setting</b> Structure and relief; Drainage system and watersheds; Mechanism of Indian monsoons and rainfall patterns, Floods and droughts; Climatic regions; Soil types and distribution.	7		
8.	<b>India's Environmental resources and management</b> India's environmental and economic resources; agriculture and food security: Infrastructure: irrigation, seeds, fertilizers, power; Institutional factors: land holdings, land tenure and land reforms; Cropping pattern, agricultural productivity, agricultural intensity, crop combination, land capability; Green revolution and its socio- economic and ecological implications.	8		
		<b>42</b>	<b>0</b>	<b>0</b>

<p><b>Evaluation criteria</b></p> <ul style="list-style-type: none"> <li>▪ 2 Minor exams: 40%</li> <li>▪ Assignments: 10%</li> <li>▪ Major test: 50%</li> </ul>
<p><b>Learning outcomes</b></p> <p>Upon completion of the course, students would be able to:</p> <ul style="list-style-type: none"> <li>▪ Understand the various components of the earth's system and its interlinkages</li> <li>▪ Explain the workings of the earth's system and feedback mechanism</li> </ul>
<p>Pedagogical approach: Lectures, tutorials and case studies</p>
<p><b>Suggested Readings</b></p> <p><b>Textbooks</b></p> <p>Strahler, 2010. Physical geography, John Wiley &amp; Sons, Inc., USA.</p> <p>Holden, 2012. An Introduction to Physical Geography and the Environment. Pearson Education Limited, Essex, England.</p> <p>Knowled R. and Wareing J., 1990. Economic and Social Geography: Made Simple, New Delhi, Rupa Publications, India.</p> <p>Singh, 2015. Physical Geography, Pravilika Publications, India.</p> <p>Bryant R.H. (1990) Physical Geography: Made Simple, Rupa Publications, New Delhi, India.</p> <p>Thornbury WD (2004), Principles of Geomorphology, CBS publication</p>
<p><b>Additional information (if any)</b></p> <ul style="list-style-type: none"> <li>▪ Research paper reading and discussions</li> </ul>
<p><b>Student responsibilities</b></p> <p>The students are expected to submit assignments in time and come prepared with readings when provided.</p>

### Course Reviewers

1. Dr Pawan Kumar Jha, Earth and Planetary Sciences, University of Allahabad.
2. Dr. Tamoghna Archarya, Xaviers School of Sustainability, Bhubaneswar.
3. Dr. Gurmeet Singh, Futuristic Research Division, National Centre for Sustainable Coastal Management, Ministry of Environment and Forests, Chennai.