

<b>Course title:</b> Current Advances in Environmental Science				
<b>Course code:</b> MPD 137		<b>No. of credits:</b> 3	<b>L-T-P distribution:</b> 42-0-6	<b>Learning hours:</b> 45
<b>Pre-requisite course code and title (if any):</b>				
<b>Department:</b> Department of Policy and Management Studies				
<b>Course Coordinator:</b> Prof. V. Subramanian			<b>Course instructor:</b> Prof. V. Subramanian	
<b>Contact details:</b> <a href="mailto:subra42@gmail.com">subra42@gmail.com</a>				
<b>Course type:</b> Core			<b>Course offered in:</b> Semester 1	
<b>Course Description:</b> The course aims at transferring basic knowledge in environmental science with a special emphasis in ecology. Based on this knowledge the students will learn and experience the practical implication of environmental science in the context of natural resource management. Lectures and tutorials will be supplemented with a field trip to expose the students to realities of land use, agriculture and water quality issues specially designed for students of social science and humanities with limited or no knowledge of physical/biological sciences; studies on sustainability requires knowledge of natural processes and their interlinkages with social and land use changes and natural resources management				
<b>Course objectives:</b>				
<ul style="list-style-type: none"> <li>The objective of the course to get the students an insight of the role of environmental science in selected fields of natural resource management in a development context.</li> </ul>				
<b>Module</b>	<b>Topic</b>	<b>L</b>	<b>T</b>	<b>P</b>
1	<b>A brief introduction to physical, natural, and environmental sciences</b> <ul style="list-style-type: none"> <li>Issues in today's earth systems</li> <li>Resources including oceans</li> <li>Shift from green to blue energy and technology</li> <li>Data basis for science and technology</li> </ul>	5	0	0
2	<b>Ecological concepts</b> <ul style="list-style-type: none"> <li>Earths system - land, oceans, water and life and changes with space and time</li> <li>Evolution and extinction - past mass extinctions and future scenario in view of forced climate change</li> <li>Origin of life and theories of evolutionary process</li> <li>Science of ecology</li> <li>Mineral and other natural resources</li> <li>Fresh water and marine ecosystem resources</li> </ul>	9	0	0
3	<b>Biodiversity- past, present, and future trends</b> <ul style="list-style-type: none"> <li>Threats to land and blue ocean biodiversity</li> <li>IUCN approach to study biodiversity</li> <li>Global and local hot spots</li> <li>Conservation measures both traditional and technology-based approach to preserve nature</li> <li>Regional and global scenes on richness and threats to flora and fauna</li> <li>Marine pollution and impact on blue water bio-resources urbanization, land use changes and biodiversity impact</li> </ul>	7	0	0

4	<b>Forestry:</b> <ul style="list-style-type: none"> <li>– Origin and distribution of forests, deforestation, and social forestry</li> <li>– types of forests and their role in carbon sink and sources</li> <li>– global approach to forest conservation</li> <li>– Urbanization and impact on forests</li> <li>– forest dwellers and their role in traditional forest conservation</li> <li>– Chipko movement (environmental conservation movement)</li> <li>– hotspots in South Asia</li> <li>– Reforestation of degraded land (case studies from Brazil, India, and Indonesia)</li> <li>– Modern forest management tools (IUCN based modern tools – case study Myanmar)</li> </ul>	6	0	0
5	<b>Agriculture:</b> <ul style="list-style-type: none"> <li>– Origin and history of agriculture</li> <li>– Diversity of crops over space and time</li> <li>– cost factors and management practices</li> <li>– Climate change and agriculture: Impact on climate change due to greenhouse gases from agricultural practices</li> <li>– Globalisation and impact on agricultural practices regionally and locally – issues specific to Indian farmers</li> <li>– Conflict with other land use pattern</li> <li>– Biotechnology and agriculture</li> </ul>	7	0	0
6	<b>Water Resources</b> <ul style="list-style-type: none"> <li>– Demand supply related conflict</li> <li>– Cost benefit, equity, and affordability</li> <li>– Rural-urban divide</li> <li>– Water conflicts at different scales</li> <li>– Impact of climate change on water resources</li> <li>– Water demand for crops, forests, people- conflicts and contradictions</li> <li>– Technology driven management practices in urban water distribution</li> </ul>	8	0	0
7	<b>Fieldwork</b> <ul style="list-style-type: none"> <li>– A short fieldwork will be conducted in Delhi to understand various environmental issues. The students will visit the field with prior questions. Both observation and interview techniques will be employed. They will observe various environmental challenges and will conduct interviews with the community to get more deeper understanding of the problems. After the visit, the students will present the observation and findings and will submit a report subsequently.</li> </ul>	0	0	6
<b>Total</b>		<b>42</b>	<b>0</b>	<b>6</b>
<b>Evaluation procedure:</b> Each module will be evaluated by written test, assignments, or oral presentations: <ul style="list-style-type: none"> <li>• Minor Test 1: 10%</li> <li>• Minor Test 2: 15%</li> <li>• Field Trip: 15 %</li> <li>• Term paper: 10%:</li> <li>• Major Test: 50%</li> </ul>				

<p><b>Learning outcomes:</b></p> <ul style="list-style-type: none"> <li>• The students will understand the principles of environmental science.</li> <li>• The students will be familiar with basic ecological principles and their application.</li> </ul>
<p><b>Pedagogical approach:</b> The course will be delivered through a mix of classroom lectures and case study discussion. The field visit and group exercises will help students understand real – life challenges and will enable them to identify practical solutions from social, environmental, and economic perspective.</p>
<p><b>Suggested Readings:</b></p> <ul style="list-style-type: none"> <li>• Cunningham and Cunningham (2007). Principles of Environmental Science, special Indian editions, Tata McGraw Education Private Limited, New Delhi</li> <li>• Driessen et al. (2001): Lecture notes on the major soils of the world, FAO 2001</li> <li>• Odum E. P. and Gray W. B. (2005). Fundamental of Ecology, Indian reprint 2007 Akash Press, New Delhi</li> <li>• Withmore, T. C. (1998). Forest Dynamics. Kapitel 7 in “An Introduction to Tropical Rain Forests” Oxford University Press, S. 109-155.</li> <li>• Rockström et al. (2009): A safe operating space for humanity, <i>Nature</i> 461, 472-475</li> <li>• Fukuoka, M (1975), One Straw Revolution, Rodale Press, New York.</li> <li>• V. Subramanian (2005) A textbook on environmental sciences, Narosa publishers. 301 pages</li> <li>• V. Subramanian (2010) Rivers of South Asia- To link or not to Link. Capital publishers. 410 pages.</li> </ul> <p><b>Other supporting readings:</b></p> <ul style="list-style-type: none"> <li>• Linden Mayer, B. and Franklin, J. F. (2006): Conserving Forest Biodiversity, A comprehensive multiscale approach, Island Press, Washington - Covelo - London</li> <li>• Millennium Ecosystem Assessment. (2005). Ecosystems and Human Well-Being - Synthesis. Washington, DC.</li> <li>• Begon M. et al. (2006): Ecology, From Individuals to Ecosystems, 4th edition, Blackwell Publishing, Malden - Oxford - Victoria</li> <li>• FAO CD 19: Soils of the tropics</li> <li>• Journal: Biodiversity Conservation</li> <li>• Journal: Forest Ecology and Management</li> <li>• Schumacher, E (1989), Small is beautiful – Economics as if People Mattered, Harper and Row Publishers, New York.</li> </ul>
<p><b>Additional information (if any):</b></p>
<p><b>Student responsibilities:</b> Attendance: At-least 75% attendance will be necessary to be able to appear for the final exam.</p>
<p><b>Course Reviewers:</b></p> <ul style="list-style-type: none"> <li>– Dr. Neeraj Khara, Biodiversity Programme, GIZ, New Delhi.</li> <li>– Dr. Peter v. d. Meer, ALTErrA, Wageningen, Netherland</li> </ul>

This Course outline was prepared by Prof V. Subramanian and approved by the 53<sup>rd</sup> Academic Council Meeting on 26th August 2022 at TERI School of Advanced Studies, New Delhi.