

Environmental Studies
(One-Semester Compulsory Core Module for Undergraduate Programmes)

Unit 1 : Introduction to environmental studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Need for public awareness.

(2 lectures)

Unit 2 : Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems :
 - a) Forest ecosystem
 - b) Grassland ecosystem
 - c) Desert ecosystem
 - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit 3 : Natural Resources : Renewable and Non-renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water : Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

(8 lectures)

Unit 4 : Biodiversity and Conservation

- Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

(8 lectures)

Unit 5 : Environmental Pollution

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

(8 lectures)

Unit 6 : Environmental Policies & Practices

- Sustainability and sustainable development.
- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act.
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context. (7 lectures)

Unit 7 : Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

(6 lectures)

Unit 8: Field work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

(Equal to 5 lectures)

Suggested Readings:

- 1 Bharucha, E. 2003, Textbook for Environmental Studies, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environmental Education and Research, Pune. 361.
- 2 Carson, Rachel. 1962. *Silent Spring* (Boston: Houghton Mifflin, 1962), Mariner Books, 2002
- 3 Economy, Elizabeth. 2010. *The River Runs Black: The Environmental Challenge to China's Future*.
- 4 Gadgil, M. & Ramachandra, G. 1993. *This fissured land: an ecological history of India*. Univ of California Press.
- 5 Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
- 6 Grumbine, R. Edward, and Pandit, M.K. *Threats from India's Himalaya dams*. *Science* 339.6115 (2013): 36-37.
- 7 Heywood V.H. & Watson, R.T. 1995. *Global Biodiversity Assessment*. Cambridge University Press.
- 8 McCully, P. 1996. *Silenced rivers: the ecology and politics of large dams*. Zed Books.
- 9 McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
- 10 Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.

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- 11 Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic press, 2011.
- 12 Rao MN and Datta AK, 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
- 13 Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.
- 14 Ricklefs, R. E., & Miller, G.L. 2000. *Ecology*. W. H. Freeman, New York.
- 15 Robbins, P. 2012. *Political ecology: A critical introduction*. John Wiley & Sons.
- 16 Rosencranz, A., Divan, S. & Noble, M.L.. *Environmental law and policy in India*. 2001. Tripathi 1992.
- 17 Sengupta, R. 2003. *Ecology and economics (OUP): An approach to sustainable development.*" OUP Catalogue.
- 18 Singh, J.S., Singh, S.P. and Gupta, S.R. 2006. *Ecology, Environment and Resource Ecology, Environment and Resource Conservation*. Anamaya Publishers.
- 19 Sodhi, N.S., Gibson, L. & Raven, P.H.G. (eds). 2013. *Conservation biology: voices from the Tropics*. John Wiley & Sons.
- 20 Van Leeuwen, C. J., & Vermeire, T. G. 2007. *Risk assessment of chemicals*.
- 21 World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford University Press.

<p>6. Workload hours per week: (The weekly workload for a 4 CC is based on 50 lectures prescribed by UGC.</p>	<p>(i) Lecture 2</p> <p>(ii) Interactive session/class 1</p> <p>(iii) Field/Project work & Report 1</p> <p>Total: 4</p>																																																				
<p>7. Teaching Schedule:</p> <p><i>For ease of teaching and uniformity in delivery of the Course, an indicative sequence of topics to be taught is suggested in the opposite column*.</i></p> <p><i>* See also Annexure 1</i></p>	<p>Compulsory Course on Environmental Studies: Lectures</p> <table border="1"> <thead> <tr> <th>Lecture</th> <th>Topic</th> </tr> </thead> <tbody> <tr><td>Lecture 1</td><td>Introduction : Multidisciplinary nature of environment</td></tr> <tr><td>Lecture 2</td><td>Scope, importance & Need for Public Awareness</td></tr> <tr><td>Lecture 3</td><td>Ecosystem : Structure & Functions</td></tr> <tr><td>Lecture 4</td><td>Energy Flows & Ecological Succession</td></tr> <tr><td>Lecture 5</td><td>Ecosystem Types: Forests & Grasslands</td></tr> <tr><td>Lecture 6</td><td>Ecosystem Types: Deserts & Aquatic</td></tr> <tr><td>Lecture 7</td><td>Natural Resources: Land & Landuse Change</td></tr> <tr><td>Lecture 8</td><td>Deforestation & Causes</td></tr> <tr><td>Lecture 9</td><td>Water: Use and Overexploitation</td></tr> <tr><td>Lecture 10</td><td>Energy Resources: Renewable & Non-Renewable</td></tr> <tr><td>Lecture 11</td><td>Biodiversity & Conservation</td></tr> <tr><td>Lecture 12</td><td>Ecosystem & Biodiversity Services</td></tr> <tr><td>Lecture 13</td><td>Threats to Biodiversity</td></tr> <tr><td>Lecture 14</td><td>Environmental Pollution: Causes, Effects & Control</td></tr> <tr><td>Lecture 15</td><td>Air & Water Pollution</td></tr> <tr><td>Lecture 16</td><td>Solid Waste Management</td></tr> <tr><td>Lecture 17</td><td>Nuclear Hazards & Human Health Risks</td></tr> <tr><td>Lecture 18</td><td>Environmental Policies : Towards Sustainability</td></tr> <tr><td>Lecture 19</td><td>Climate Change & Impacts</td></tr> <tr><td>Lecture 20</td><td>Environmental Laws and Acts</td></tr> <tr><td>Lecture 21</td><td>Human Population Growth & Environmental Degradation</td></tr> <tr><td>Lecture 22</td><td>Natural Disasters & Management</td></tr> <tr><td>Lecture 23</td><td>Environmental Movements: Indian & International</td></tr> <tr><td>Lecture 24</td><td>Environmental Ethics</td></tr> <tr><td>Lecture 25</td><td>Indian Culture & Environmental Practices</td></tr> </tbody> </table>	Lecture	Topic	Lecture 1	Introduction : Multidisciplinary nature of environment	Lecture 2	Scope, importance & Need for Public Awareness	Lecture 3	Ecosystem : Structure & Functions	Lecture 4	Energy Flows & Ecological Succession	Lecture 5	Ecosystem Types: Forests & Grasslands	Lecture 6	Ecosystem Types: Deserts & Aquatic	Lecture 7	Natural Resources: Land & Landuse Change	Lecture 8	Deforestation & Causes	Lecture 9	Water: Use and Overexploitation	Lecture 10	Energy Resources: Renewable & Non-Renewable	Lecture 11	Biodiversity & Conservation	Lecture 12	Ecosystem & Biodiversity Services	Lecture 13	Threats to Biodiversity	Lecture 14	Environmental Pollution: Causes, Effects & Control	Lecture 15	Air & Water Pollution	Lecture 16	Solid Waste Management	Lecture 17	Nuclear Hazards & Human Health Risks	Lecture 18	Environmental Policies : Towards Sustainability	Lecture 19	Climate Change & Impacts	Lecture 20	Environmental Laws and Acts	Lecture 21	Human Population Growth & Environmental Degradation	Lecture 22	Natural Disasters & Management	Lecture 23	Environmental Movements: Indian & International	Lecture 24	Environmental Ethics	Lecture 25	Indian Culture & Environmental Practices
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<p>8. Assessment (Marks and %age): (Indicates % breakdown for each assessment component and for the Final Examination*.)</p> <p><i>* Final Examination to be conducted by the Examination Branch, University of Delhi & dates to be announced by the University</i></p>	<table border="1"> <thead> <tr> <th>Assessment/Evaluation:</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>(i) Field-Work (Assignment/Report)</td> <td>25%</td> </tr> <tr> <td>(iv) Final Exam:</td> <td>75%</td> </tr> <tr> <td> (a) Short answers - 25 marks (25%)</td> <td></td> </tr> <tr> <td> (b) Essay type with choice - 50 marks (50%)</td> <td></td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </tbody> </table>	Assessment/Evaluation:	Marks	(i) Field-Work (Assignment/Report)	25%	(iv) Final Exam:	75%	(a) Short answers - 25 marks (25%)		(b) Essay type with choice - 50 marks (50%)		Total	100%																																								
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<p>9. Course Lecturer/s: (College/s/Department/s)</p>	<p>Teachers of various Departments in respective colleges shall teach ENV51 Course. Each College shall appoint a Coordinator from among the teachers involved.</p>																																																				

		the Course under intimation to Head, Dept of Environmental Studies. Wherever necessary, seek assistance/guidance of Head, Dept of Environmental Studies for smooth teaching Course.
10.	Modes of Teaching and Learning: (Lectures, Seminars, Discussions, Regular tests, Q & A).	An optimal combination and mix of approaches followed in teaching and learning this course. include: <ul style="list-style-type: none"> • Lectures/seminars and discussion sessions • Video presentations • Field visits/excursions • Interactive session/class • Project activity/ report writing/presentation
11.	Interdisciplinarity & Multidisciplinarity	Inter-disciplinarity will be the main focus of learning strategies. The course content and readings draw heavily from ideas developed in disciplinary works. Likewise, the course will be cross-discipline based.