

VALUE ADDED COURSES

VAC-1: Environmental Education-I

Credit- 2

Sub Code	L	T	P	Duration	IA	ESE (T)	Total	Credits
FOUAVL1	2	-		2 hours	30	70	100	2

Course objectives:

1. Develop a critical understanding of the environmental issues of concern
2. Understand the concept of natural resources; identify types of natural resources, their distribution and use with special reference to India.
3. Explain sustainable development, its goals, targets, challenges and global strategies for sustainable development.
4. Understand the concepts of ecosystems and its role in environment.

Unit I. Humans and the Environment-

The man-environment interaction: Humans as hunter-gatherers; Industrial revolution and its impact on the environment; Population growth and natural resource exploitation. The Club of Rome- Limits to Growth; UN Conference on Human Environment 1972; World Commission on Environment and Development and the concept of sustainable development; Rio Summit and subsequent international efforts.

Unit II. Natural Resources and Sustainable Development

Overview of natural resources: Classification of natural resources- biotic and abiotic, renewable and non-renewable. Biotic resources: forests, grasslands, wetlands, wildlife and aquatic. Water resources: Types of water resources- fresh water and marine resources. Renewable and non-renewable sources of energy; Conventional energy sources- coal, oil, natural gas, nuclear energy; Non-conventional energy sources- solar, wind, tidal, hydro, wave, ocean thermal, geothermal, biomass, hydrogen and fuel cells. Introduction to sustainable development: Sustainable Development Goals (SDGs).

Unit III. Environmental Issues: Local, Regional and Global

Environmental issues and scales: Extents of local, regional, and global phenomena. Pollution: Impact of sectoral processes on Environment; Types of Pollution- air, noise, water, soil, thermal, radioactive; municipal solid waste, hazardous waste. Land use and Land cover change: land degradation, deforestation, desertification, urbanization. Biodiversity loss: past and current trends, impact. Global change: Ozone layer depletion; Climate change. Disasters – Natural and Man-made

Unit IV. Conservation of Biodiversity and Ecosystems

Biodiversity and its distribution: Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots. Ecosystems and ecosystem services: Major ecosystem types in India and their basic characteristics forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services- classification and their significance. Threats to biodiversity and ecosystems. Major conservation policies: in-situ and ex-situ conservation approaches; Major protected areas; the role of traditional knowledge, community-based conservation; Gender and conservation.

Unit V. Environmental Pollution and Health

Understanding pollution: Definition of pollution; Point sources and non-point sources of pollution. Air pollution. Water pollution: Sources of water pollution; water quality. Soil pollution and solid waste: Soil

pollutants and their sources; Solid and hazardous waste. Noise pollution: Sources of noise pollution; Noise standards; adverse impacts on human health. Thermal and Radioactive pollution: Sources and impact on human health and ecosystems.

Unit VI. Climate Change: Impacts, Adaptation and Mitigation

Understanding climate change: Natural variations in climate; Structure of atmosphere; Anthropogenic climate change from greenhouse gas emissions– past, present and future; Projections of global climate change with special reference to temperature, rainfall, climate variability and extreme events; Importance of 1.5 °C and 2.0 °C limits to global warming. Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality; National and international policy instruments for mitigation, and net zero targets for the future; Energy efficiency measures; Renewable energy sources; Carbon capture and storage, National climate action plan and Intended Nationally Determined Contributions (INDCs); Climate justice.

Suggested readings

1. Sharma PD and Sharma PD. 2012. Ecology And Environment. Publisher: Rastogi Publications, ISBN:9788171339051, 8171339050
2. Deswal A. And Deswal S. 2013. A Basic Course In Environmental Studies, Dhanpat Rai & Co.
3. Erach Bharucha (2021). Textbook of Environmental Studies for UG 3RD Edition
4. Fisher, Michael H. (2018) An Environmental History of India- From Earliest Times to the Twenty-First Century, Cambridge University Press.
5. Headrick, Daniel R. (2020) Humans versus Nature- A Global Environmental History, Oxford University Press.
6. Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future. 10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson.
7. John W. Twidell and Anthony D. (2015). Renewable Energy Sources, 3rd Edition, Weir Publisher (ELBS)
8. Harper, Charles L. (2017) Environment and Society, Human Perspectives on Environmental Issues 6th Edition. Routledge.
9. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley- Blackwell.
10. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press.
11. Sinha, N. (2020) Wild and Wilful. Harper Collins, India.
12. Bhagwat, Shonil (Editor) (2018) Conservation and Development in India: Reimagining Wilderness, Earthscan Conservation and Development, Routledge.
13. Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK
14. Miller, G. T., & Spoolman, S. (2015) Environmental Science. Cengage Learning.
15. Central Pollution Control Board Web page for various pollution standards. <https://cpcb.nic.in/standards/>
16. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
17. Pittock, Barrie (2009) Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge.
18. www.ipcc.org; <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>.
19. Adenle A., Azadi H., Arbiol J. (2015). Global assessment of technological innovation for climate change adaptation and mitigation in developing world, Journal of Environmental Management, 161 (15): 261-275.

20. Barnett, J. & S. O'Neill (2010). Maladaptation. Global Environmental Change—Human and Policy Dimensions 20: 211–213.

VAC-2: Environmental Education-II

Credit- 2

Sub Code	L	T	P	Duration	IA	ESE (T)	Total	Credits
FOUBVL1	2	-		2 hours	30	70	100	2

Course objectives:

1. Develop an understanding of pollution through experiential learning.
2. Acquire knowledge on major international institutions and programmes and their role in conservation of the environment.
3. To learn about the biodiversity management practices, plantation care activities and nature care methods.
4. Acquainted with the major international treaties and our country's stand on and responses to the major international agreements.

UNIT I. Environmental Management

Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control. Environmental management system: ISO 14001 Concept of Circular Economy. Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme

Unit II. Environmental Treaties and Legislation

An overview of instruments of international cooperation; bilateral and multilateral agreements; conventions and protocols; COP, Major International Environmental Agreements: CBD; UNCCD; Vienna Convention; Montreal Protocol; UNFCCC; Kyoto Protocol; Paris Agreement; Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002; The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; National Green Tribunal; Major International organizations and initiatives: UNEP, IUCN, WCED, UNESCO, IPCC, MAB programme.

Unit III. Case Studies and Field Work

The students are expected to be engaged in some of the following or similar identified activities: Discussion on one national and one international case study related to the environment and sustainable development.

1. Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report.
2. Participation in plantation drive and nature camps.
3. Documentation of campus biodiversity.
4. Campus environmental management activities such as solid waste disposal, water Management and sanitation, and sewage treatment.

Suggested Readings

1. Jørgensen, Sven Marques, Erik João Carlos and Nielsen, Søren Nors (2016) Integrated Environmental Management, A transdisciplinary Approach. CRC Press.
 2. Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press.
 3. Tiefenbacher, J (ed.) (2022), Environmental Management - Pollution, Habitat, Ecology, and Sustainability, Intech Open, London. 10.5772/
 4. UNEP (2007) Multilateral Environmental Agreement Negotiator's Handbook, University of Joensuu, ISBN 978-952-458-992-5
 5. Kanchi Kohli and Manju Menon (2021) Development of Environment Laws in India, Cambridge University Press.
 6. India Code – Digital repository of all Central and State Acts: <https://www.indiacode.nic.in/>
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