EVS VA 1210: ENVIRONMENTAL SCIENCE - II

Credit: 2 (L-2: T-0:P-0) **Theory:** 30 Lectures

COURSE OBJECTIVES

The primary objective of the course is to provide students a strong foundation in environmental science by studying topics like Human and Environment, Natural Resources, Biodiversity, and Our Ecosystem. It encourages critical analysis of environmental issues and the growth of strong problem-solving abilities in children.

COURSE LEARNING OUTCOME

After completing this unit, students will be able to:

- Develop an understanding of pollution and its types.
- Learn about sources of different kinds of pollution.
- Sensitize themselves to adverse health impacts of pollution.
- Gain a comprehensive knowledge of climate change, its science and response measures
- have an overview of national and global efforts to address climate change adaptation and mitigation.
- Develop a critical understanding of the complexity of environmental management.
- Understand broad aspects of environmental management systems.
- Understand different methods of assessing environmental quality and associated risks.
- Learn about how the nations across the globe work together for the environment.
- Learn about the major international treaties and our country's stand on and responses to the major international agreements.
- Learn about major international institutions and programmes and the role played by them in the protection and preservation of the environment.

BROAD CONTENTS OF THE COURSE

- Environmental Pollution and Health
- Climate Change: Impacts, Adaptation and Mitigation
- Environmental Management
- Environmental Treaties and Legislation

SKILLS TO BE LEARNED

- To deal with the pollution and pollution related effect on human body.
- To explore the legal aspects related to environment

DETAILED CONTENTS OF THE COURSE

MODULE 1

Environmental Pollution and Health: (4 hours)

Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. **Air pollution:** Primary and secondary pollutants; Criteria pollutants- carbon monoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and Sulphur dioxide; Other important air pollutants (VOCs, PAN, PAHs, POPs), Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. **Water pollution:** Sources of water pollution in river, lake, marine and ground water, water quality Water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. **Soil**

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pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health. **Noise pollution:** Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. **Thermal and Radioactive pollution:** Sources and impact on human health and ecosystems.

Climate Change: Impacts, Adaptation and Mitigation (6 hours)

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; Climate change projections for the Indian sub-continent. ***Impacts of climate change:*** Observed impacts on ocean and land systems; Sea level rise, changes in marine and coastal ecosystems; Impacts on forests and natural ecosystems; Impacts on animal species, agriculture, health, urban infrastructure; the concept of vulnerability and its assessment; Adaptation vs. resilience; Climate-resilient development; Indigenous knowledge for adaptation to climate change. **Mitigation of climate change:** Synergies between adaptation and mitigation measures; Green House Gas (GHG) reduction vs. sink enhancement; Energy efficiency measures; Renewable energy sources; Carbon capture and storage, National climate action plan and Intended Nationally Determined Contributions (INDCs); Climate justice.

MODULE 2

Environmental Management: (3 hours)

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, Life cycle analysis; Cost-benefit analysis Environmental audit and impact assessment; Environmental risk assessment Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme

Environmental Treaties and Legislation: (6 hours)

An overview of major international environmental agreements and programmes: adoption, ratification, binding and non-binding measures. Conference of the Parties (COP) to UNFCCC, Convention on Biological Diversity (CBD),1992; Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention, 1971; United Nations Convention to Combat Desertification (UNCCD), 1994; Vienna Convention, 1985; Kigali Amendment, 2016; Basel Convention, 1989; Minamata Convention, 2013; United Nations Framework Convention on Climate Change (UNFCCC), 1992; Kyoto Protocol, 1997; India's status as a party to major conventions. **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 Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; India's National Action plan on Industry-specific environmental standards, Waste management rules, Ramsar sites, Biosphere reserves, Protected Areas, Ecologically Sensitive Areas, Coastal Regulation Zone, Status phase-out of production and consumption of Ozone Depleting Substances and National Green Tribunal.

Major International organisations and initiatives :(1 hour)

United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN), World Commission on Environment and Development (WCED), United Nations Educational, Scientific and Cultural Organization (UNESCO).

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MODULE 3

Case Studies and Field Work:

(20 % of total Marks of the course is to be based on this Module)

In this module, the students have to be engaged in one activity on of the category listed below and they have to submit a report on the activity he/she has done.

Ecological Surveys: Students may conduct ecological surveys in various habitats, such as forests, wetlands, or coastal areas. They learn to identify different species, assess biodiversity, measure environmental parameters, and understand the ecological dynamics of the area.

Water Quality Assessment: Students may collect water samples from rivers, lakes, or groundwater sources to assess water quality parameters such as pH, dissolved oxygen, turbidity, and nutrient levels. They learn about water pollution sources, the impacts on aquatic ecosystems, and potential remediation strategies.

Air Pollution Monitoring: Students may measure air quality in urban or industrial areas using air quality monitoring equipment. They learn about the sources and impacts of air pollution, analyze data, and explore strategies for air pollution control.

Environmental Impact Assessment: Students may engage in conducting environmental impact assessments for development projects. They learn to evaluate potential environmental impacts, identify mitigation measures, and consider the social and ecological consequences of different development options.

Waste Management and Recycling: Students may visit waste management facilities, recycling centers, or landfill sites to understand waste management practices. They learn about waste generation, recycling processes, waste treatment technologies, and the importance of waste reduction and resource conservation.

Restoration Projects: Students may participate in ecological restoration projects, such as reforestation, wetland restoration, or habitat enhancement. They learn about the importance of ecosystem restoration, restoration techniques, and the role of ecological succession.

Environmental Policy Analysis: Students may analyze and evaluate environmental policies and regulations at the local, national, or international levels. They learn to assess policy effectiveness, identify gaps, and propose recommendations for improved environmental governance.

Community Engagement and Environmental Awareness: Students may collaborate with local communities, NGOs, or government agencies to raise environmental awareness and promote sustainable practices. They may organize community clean-up campaigns, tree plantations, or awareness workshops.

TEXT BOOKS

1. Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education, Erach Bharucha, (https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf)
2. Perspectives in Environmental Studies is authored by eminent environmental scientists Dr. Anubha Kaushik and Dr. C.P. Kaushik, NEW AGE International Publishers.

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18. Kanchi Kohli and Manju Menon (2021) Development of Environment Laws in India, Cambridge University Press.
19. India Code – Digital repository of all Central and State Acts: https://www.indiacode.nic.in/
20. . Bohra, Saroj, Judicial Intervention and Evolution of Environmental Principles and Doctrines (January 7, 2019). Available at SSRN: https://ssrn.com/abstract=3311406 or http://dx.doi.org/10.2139/ssrn.3311406.

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