

HNB Garhwal University
(A Central University)
Srinagar-Garhwal, Uttarakhand
School of Life Sciences

Syllabus
PG Diploma in Environmental Management
(Effective from Academic Session 2022-23)

SEMESTER I

PAPER CODE	PAPER NAME	CREDITS
SOLS/EVM-C-001	Introduction to Environment	03
SOLS/EVM- C-002	Natural resource Management	03
SOLS/EVM-C-003	Environmental Economics, Sociology and Sustainable Development	03
SOLS/EVM-C-004	Environmental Monitoring , Pollution and its Control	03
SOLS/EVM-C-005	Lab Course –I	03
SOLS/EVM-C-006	Lab Course –II	03
SOLS/EVM-SS-001	Mountain Ecology	03
TOTAL	18 Core Credits, 03 Self study Credits	

SEMESTER II

PAPER CODE	PAPER NAME	CREDITS
SOLS/EVM-C-007	Disaster management	03
SOLS/EVM-C-008	Environmental Management	03
SOLS/EVM-C-009	Lab Course- III	03
SOLS/EVM-E-001	Environmental Laws and Policies	03
SOLS/EVM-E-002	Dissertation	06
TOTAL	09 Core Credits, 09 Elective Credits	

Total Credits: 39 (Core = 27, Elective=09, Self study=03)

SEMESTER I

(03 credits)

SOLS/EVM-C 001 Introduction to Environment

Unit I. Environment

- 1.1 Definition, scope and importance of Environmental Sciences
- 1.2 Components of environment: atmosphere, hydrosphere, lithosphere and biosphere
- 1.3 Concept of Biosphere-2, Noosphere and Technosphere
- 1.4 Various activities under national environment awareness Campaigns (NEAC)

Unit II. Man and Environment Relationship

- 2.1. Pre-historic man and Environment
- 2.2. Hunting and Gathering society and Environment
- 2.3 Pastoralism and Environment
- 2.4 Agro-society and Environment
- 2.5 Industrial society and Environment
- 2.6 Future Society (Sustainable Society)

Unit III. Religion, Culture and Environment

- 3.1 Role of religion, culture and traditions in conserving environment
- 3.2 Hinduism and Environment
- 3.3 Buddhism and Environment
- 3.4 Islam and Environment
- 3.5 Christianity and Environment

Unit IV. Ecosystem

- 4.1 Structure and types of an ecosystem
- 4.2 Energy pathways and ecological processes
- 4.3 Ecosystem productivity (primary and secondary)
- 4.4 Biogeochemical cycles: Nitrogen, Carbon, Phosphorus, Sulphur, Water and Oxygen
- 4.5 Food chain, food web and ecological pyramids
- 4.6 Ecological succession: primary and secondary succession, climax communities and trends in succession

Unit V. Environmental Issues and Problems

- 5.1 Green house effect, Global warming and climate change
- 5.2 Conflicts on emission of green house gases
- 5.3 Eutrophication
- 5.4 Mega dams and its impact on Environment
- 5.5 International and national water disputes and coastal zone conflicts

Unit I. Principles of Natural Resource Management

- 1.1. Natural resources- concepts, kinds and their values
- 1.2. Process of resource depletion
- 1.3. Ecosystem services by various natural resources

Unit II. Forest and Wildlife Resources and their Management

- 2.1. Forest resources: Major Forest types, their characteristics and distribution, status of forest cover
- 2.2. Forest use, over exploitation and management practices
- 2.3. Wildlife resources: Current status, services and threats
- 2.4. Human-wildlife conflict and its resolution
- 2.5. Principles and practices of wildlife management: Need for wild life planning

Unit III. Water Resources and their Management

- 3.1 Water resources: Historical background, world scenario and current challenges, status of surface and groundwater
- 3.2 Use and over exploitation of surface and ground waters
- 3.3 Integrated Water Resource Management (IWRM): Key challenges and issues
- 3.4 Legal aspects of water resources and management

Unit IV. Energy Resources and their Management

- 4.1 Definition, concept and classification of energy resources
 - 4.2 Non-renewable energy resources
 - 4.3 Renewable energy resources
- Energy Management: Energy crisis, energy audit and sustainable use of energy resources

Unit V. Geo Resources and their Management

- 5.1 Mineral resources: Minerals, their classification, resources and reserves, exploitation of mineral resources
- 5.2 Environmental impact of extracting, processing and smelting of minerals
- 5.3 Conservation and Management of geo-resources

SOLS/EVM-C003: Environmental Economics, Environmental Sociology and Sustainable Development (03 credits)

Unit I. Introduction to Environmental Economics

- 1.1 Definition, concepts, scope and issues
- 1.2 Concept of the commons, tragedy of commons, externalities (indirect costs), economic good/ service supply, demand, intangibles, public goods and bads
- 1.3 Limitations of Environmental Economics

Unit II. Economic Tools

- 2.1 Valuing the environment and natural resources
- 2.2 Ecology and equity
- 2.3 Natural resource accounting, cost-benefit analysis
- 2.4 Life cycle assessment (LCA)
- 2.5 Intellectual property rights (IPR) and environment

Unit III. Introduction to Environmental Sociology

- 3.1 Definition, concepts, scope and issues
- 3.2 Concept of caste, tribe, clan, society and social structure
- 3.3 Cultural resources

Unit IV. Social Issues and the Environment

- 4.1 Resettlement and rehabilitation: Problems and concerns
- 4.2 National Policy for Rehabilitation and resettlement (NPRR 2007)
- 4.3 Major environmental movements (Chipko, Appiko, Narmada Bachao Andolan, Tehri dam conflicts and Silent valley movement, Nadi Bachao Andolan, Beej Bachao Andolan)

Unit V. Sustainable Development

- 5.1 Principles of Sustainable Development: History and emergence of the concept and definition of Sustainable Development
- 5.2 Goals of Sustainable Development
- 5.3 Stake holders of Sustainable development: People, Government, investor, Industry, Judiciary & international organization working for Sustainable development
- 5.4 From unsustainable to sustainable development

SOLS/EVM-C-004: Environmental Monitoring, Pollution and its Control (3 Credits)

Unit I. Environmental Monitoring

- 1.1 Concept and objectives of environmental monitoring
- 1.2 Global environmental monitoring system (GEMS)
- 1.3 National environmental monitoring programmes
- 1.4 Bioindicators and biological monitoring

Unit II. Air Pollution

- 2.1 Sources of air pollution
- 2.2 Effects of pollutants on human beings, plants and animals
- 2.3 Methods of monitoring of gaseous and particulate pollutants
- 2.4 Control of air pollution

Unit III. Water Pollution

- 3.1 Major sources of water pollution
- 3.2 Effects of water pollution on animals, plants and human beings
- 3.3 Sewage and wastewater treatment and recycling
- 3.4 Industrial effluent treatment

Unit IV. Noise Pollution

- 4.1 Sources of noise pollution
- 4.2 Measurement of noise, exposure levels and standards
- 4.3 Impact of noise on human health
- 4.4 Noise control and abatement measures

Unit V. Radioactive and Thermal Pollution

- 5.1 Radioactive pollution: causes and consequences
- 5.2 Radioactive fallout, Chernobyl Accident: Three Mile Island accident, Fukushima radio-active leakage
- 5.3 Radioactive waste management
- 5.4 Thermal pollution: causes and consequences

Unit VI. Solid Waste Management

- 6.1 Types and major sources of solid waste
- 6.2 Solid waste and environmental problems
- 6.3 Integrated solid waste management of municipal waste
- 6.4 Management of industrial waste

SOLS/EVM-C-005 Lab course I

(3 Credits)

- Exercise 01. Analysis of various components (producer, consumer, decomposer) of ecosystems- lake, pond, river, forest, and mountain
- Exercise 02. Calculation of Importance Value Index (IVI) of different plant species in a grassland ecosystem/forest patch
- Exercise 03. Calculation of frequency, density and abundance of different macrozoobenthos dwelling in the riverine/ lacustrine ecosystem
- Exercise 04. Determination of soil texture in different terrestrial habitats
- Exercise 05. Monitoring of biological diversity and calculation of Shannon Wiener diversity index in aquatic/ terrestrial habitats
- Exercise 06. To prepare an inventory of natural resources of any forest ecosystem located in nearby area.
- Exercise 07. To study the characteristics and functions of a watershed.
- Exercise 08. To study principle and working of solar cooker.
- Exercise 09. To study principle and working of water heating system.
- Exercise 10. To study principle and working of water mill (*Gharat*)

SOLS/EVM-C-006 Lab course II

(3 Credits)

- Exercise 1. To study socio-economic status- Preparing of questionnaire and case studies
- Exercise 2. Inventorization of local NTPFs.
- Exercise 3. Economic evaluation of a forest area/lake/river
- Exercise 4. Cost-benefit analysis of a river valley project
- Exercise 5. Market survey for forest products
- Exercise 6. Monitoring of particulate matter (PM_{10} and $PM_{2.5}$) in ambient air
- Exercise 7. Monitoring of gaseous pollutants (NO_x and SO_x) in ambient air
- Exercise 8. Determination of Noise levels at different places
- Exercise 9: National and International water quality standards
- Exercise 10. National and International air quality standards

SEMESTER II

SOLS/EVM-C-007 Disaster Management

(03 credits)

Unit I. Disaster Introduction: an overview

- 1.1 Introduction and definition of vulnerability, risk, hazard, disaster and catastrophe
- 1.2 Hazards in Himalaya
- 1.3 Coastal disaster and Hazards of plains
- 1.4 Impact of disaster on economy and society
- 1.5 Disaster management and sustainability

Unit II. Natural Disasters

- 2.1 Natural disasters: introduction, meaning and nature
- 2.2 Natural Disasters in Himalaya: Earthquake, cloud burst, Glacier lake outburst (GLOF), Landslides, Snow Avalanches, flesh-flood
- 2.3 Natural disaster: Cyclone, volcanic eruptions, drought, floods, heat and cold waves and Tsunami

Unit III. Anthropogenic Disasters

- 3.1 Anthropogenic disasters: introduction, meaning and nature
- 3.2. Nuclear disaster, fires (Forest fire, Building, coal, and chemical fires), Desertification causes, effects, management
- 3.3 Transportation Accidents, war, stamped and riots: causes, effects, management

Unit IV: Disaster Mitigation and Management

- 4.1. Risk and Vulnerability assessment: Risk analysis techniques, vulnerability identification, concept and factors associated with vulnerability.
- 4.2 Disaster management cycle
- 4.3 Disaster preparedness: Concept and nature, Disaster preparedness plans, Role of Information, education, communication, & awareness.
- 5.4 Disaster mitigation: Concept, principles, mitigation approaches and strategies.
- 4.5 Disaster Response: Disaster response plans, Search, Rescue and evacuation, Community Health and Casualty Management and damage assessment.
- 4.6 Recovery: Rehabilitation, Its social and economic aspects, Housing to resist disasters

SOLS/EVM-C 008: Environmental Management

(03 Credits)

Unit I: Environmental Management

- 1.1 Concept, objective and scope of environmental Management
- 1.2 Environmental management in terms of developmental projects
- 1.3 Environmental management and sustainability

Unit II. Environmental Impact Assessment (EIA)

- 2.1 Concept, scope and objectives of EIA
- 2.2 Developmental projects under EIA
Impact assessment methodologies and Procedure of EIA
- 2.3 EIA Law and Policy: An overview
- 2.4 Public consultation
- 2.5 Concept of cumulative impact assessment
- 2.6 Statuary clearance procedure

Unit III. Environmental Auditing

- 3.1 Principles and guidelines of environmental auditing
- 3.2 Procedure of environmental auditing
- 3.3 ISO 14000 series: ISO 9001, 9002

Unit IV. Environmental Management Plan

- 4.1 Concept, scope, objectives and guidelines for EMP
- 4.2 Development of EMP- air, water, groundwater, noise and land
- 4.3 Rehabilitation and resettlement
- 4.4 Compensatory afforestation

Unit V: Watershed Management

- 5.1. Definition, concept, and scope and characteristics of watershed
- 5.2 Factors influencing watershed functioning
- 5.3 Common approach for watershed development

SOLS/EVM-C 009: Lab course III

(03 credits)

- Exercise 01. Understanding of flash flood and landslides
- Exercise 02. Study of disaster prone areas
- Exercise 03. Role of various agencies in disaster management
- Exercise 04. Rehabilitation of People from disaster affected areas
- Exercise 05. Preparation of master plan for any Environmental Hazard mitigation
- Exercise 06. To study the goals of sustainable development
- Exercise 07. To study the procedures of EIA
- Exercise 08. To study the procedures of Environmental Auditing
- Exercise 09. To study the major components of EMP
- Exercise 10. Common Approach for Watershed Development in India

SOLS/EVM-E 001: Environmental Laws and Policies

(03 credits)

Unit I. National and International Efforts

- 1.1 Environmental - issues and problems
- 1.2 Environmental protection in the Indian Constitution (Article 48a, Article 51A (g))
- 1.3 International efforts (Stockholm Conference, Montreal, Kyoto protocol, Ramsar Convention, CITES)

Unit II. National Environmental Laws-1

- 2.1 Indian Forest Act 1927; The Forest Conservation Act 1980 and rules 1981
- 2.2 Wildlife Protection Act 1972 amended 1991
- 2.3 The Water (Prevention and Control of Pollution) Act 1974 and Rules 1975 and its later amendments
- 2.4 The Air (Prevention and Control of Pollution) Act 1978 and Rules 1982 and its later amendments
- 2.5 The Environmental (Protection) Act 1986 and Rules 1986

Unit III. National Laws –II

- 3.1 National Green Tribunal Act 2010
- 3.2 Public Liability Insurance Act 1991
- 3.3 Biomedical waste (Management and handling) Rules 1998
- 3.4 Hazardous waste (Management and handling) Rules 1989
- 3.5 The Biological Diversity Act 2002

Unit IV. National Policies

- 4.1 Forest Policy
- 4.2 Environmental Policy
- 4.3 Water Policy