ENVIRONMENTAL MANAGEMENT

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (16)
ENV2151	Environmental Studies-I *	2	0	0	2
ENV2251	Environmental Studies-II *	2	0	0	2
ENV2152	Environmental Studies *	4	0	0	4
ENV2252	Environmental Studies *	4	0	0	4
ENV2351	Environmental Pollution and Waste Management	3	0	0	3
ENV2451	Environmental Management and Industrial Safety	3	0	0	3
ENV2551	Environmental Economics and Globalization	3	0	0	3
ENV2651	Sustainable Development Practices	3	0	0	3

(* Environmental Studies is mandatory for all undergraduate courses and is taught in three different schemes during first year)

ENVIRONMENTAL MANAGEMENT

Syllabus - Semester First

ENVIRONMENTAL STUDIES-I

Course Code: ENV2151 **Credit Units: 02**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha, E., The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India.
- Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
- Cunningham, W.P., Cooper, T.H., Gorhani, E.& Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R).
- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford University Press, 473p.
- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H.& Waston, R.T., 1995, Global Biodiversity Assessment, Cambridge University Press, 1140p.
- Jadhav, H.& Bhosale, V.M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M., 1996, Environmental Science Systems &Solutions, Web enhanced edition, 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB).
- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
- Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
- Rao, M N. & Datta, A.K., 1987,Waste Water treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p.
- Sharma, B.K., 2001, Environmental Chemistry. Geol Publ. House, Meerut.
- Survey of the Environment, The Hindu (M).
- Townsend, C., Harper, J., and Michael Begon, Essentials of Ecology, Blackwell Science.
- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).

Syllabus - Semester Second

ENVIRONMENTAL STUDIES-II

Course Code: ENV2251 **Credit Units: 02**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: Environnemental Pollution
Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.
Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module II: Social Issues and the Environment
From unsustainable to sustainable development, Urban problems related to energy
Water conservation, rain water harvesting, and watershed management
Resettlement and rehabilitation of people, its problems and concerns, case studies
Environmental ethics: issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module III: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes, Environment and human health
Human Rights, Value education, HIV/ AIDS, Women and child welfare
Role of information technology in environment and human health, Case studies

Module IV: Field Work
Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain
Visit to a local polluted site – urban / rural / industrial / agricultural
Study of common plants, insects, and birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

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- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).
- Trivedi, R.K. and Goel,P.K., Introduction to air pollution, Techno-Science Publication (TB).
- Wanger, K.D., 1998, Environnemental Management,W.B. Saunders Co. Philadelphia, USA 499p.

Syllabus - Semester First / Second

ENVIRONMENTAL STUDIES

Course Code: ENV2152 / ENV2252 **Credit Units: 04**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of

biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Module V: Environnemental Pollution
Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.
Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module VI: Social Issues and the Environment
From unsustainable to sustainable development, Urban problems related to energy
Water conservation, rain water harvesting, and watershed management
Resettlement and rehabilitation of people, its problems and concerns, case studies
Environmental ethics: issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module VII: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes, Environment and human health
Human Rights, Value education, HIV/ AIDS, Women and child welfare
Role of information technology in environment and human health, Case studies

Module VIII: Field Work
Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain
Visit to a local polluted site – urban / rural / industrial / agricultural
Study of common plants, insects, and birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

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- Trivedi, R.K. and Goel,P.K., Introduction to air pollution, Techno-Science Publication (TB).
- Wanger, K.D., 1998, Environnemental Management,W.B. Saunders Co. Philadelphia, USA 499p.

Syllabus - Semester Third

ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT

Course Code: ENV2351 **Credit Units: 3**

Course Objective:
The growing pressure on natural resources and the progressive increase in the production of waste poses serious challenges for our society. Waste production and management play a central role in environmental policy. The production of industrial and urban waste has exploded during the last ten years. From a modern viewpoint, waste is to be considered a lost resource and, hence, it is a manufacturing cost variable that must be optimized with both direct costs and the cost to society in mind. Since it is not possible to avoid the production of waste, the main objective in order of importance is to try to reduce it to a minimum.

Course Contents:
Module I: Water pollution – sources, types, and effect of water pollutants, water quality standards, algal bloom, eutrophication, biomagnification/ bioaccumulation, water pollution control - primary, secondary and tertiary wastewater treatment; **Soil Pollution** – soil pollutants – types, sources, effects, and control.

Module II: Air pollution – structure and composition of atmosphere, classification, sources and effects of air pollutants, air pollution control - particulate and gaseous emission control methods; acid rain, green house effect, global warming, ozone depletion, smog, climate change, **Noise Pollution** – sources, effects, and control.

Module III: Waste management: Methods of waste collection, storage, and transportation, treatment and disposal techniques for solid waste: landfill operation and maintenance, composting: advantages and limitations, vermin-composting, autoclaving, incineration, biogas plant, techniques for hazardous waste treatment and safe disposal, nuclear and e-waste management, Government agencies and programs: NCEPC, MoEFCC, CPCB and SPCB's.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination.

Syllabus - Semester Fourth

ENVIRONMENTAL MANAGEMENT AND INDUSTRIAL SAFETY

Course Code: ENV2451 **Credit Units: 03**

Course Objective:
The course will give an overview of the safety and environmental issues in the industry. It will provide detailed understanding of the methods and techniques to resolve these key issues for making production and processing cleaner and safer. This course would educate students to identify and assess hazards in any stage of operation, to quantify and manage them as well. This course will also highlight lessons learnt from the past accidents. The aims of this course are: to create awareness for quality of life protection, health and environmental safety, occupational hazards.

Course Contents:
Module I: Public health: definition, need for good health, factors affecting health, communicable diseases, mode of transmission (epidemic and endemic diseases), management of hygiene in public places, occupational health hazards and safety (physical, chemical and biological), health protection measures for workers- health education, first aid, management of medical emergencies.

Module II: Industrial safety and management techniques: industrial safety standards and regulations, accidents – definition, prevention and control, risk analysis and assessment, safety cost and expenses.

Module III: Safety management system - environmental management systems (EMS) ISO 14000 and 14001, OSHA and NIOSH, compensation act, public liability insurance act, mining act, good manufacturing practices (GMP) and good laboratory management practices (GLP).

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Syllabus - Semester Fifth

ENVIRONMENTAL ECONOMICS AND GLOBALIZATION

Course Code: ENV2551 **Credit Units: 03**

Course Objective:
Environmental issues such as pollution, climate change and the conservation of biodiversity are currently in the headlines of economic debate. Economic analysis of the environment is challenging precisely because environmental value is not always conveniently revealed in a market, and thus is subject to inappropriate use. The major topics addressed in this field of study are: the causes of environmental degradation, the need to re-establish the disciplinary ties between ecology and economics, the difficulties associated with assigning ownership right to environmental resources, the trade-off between environmental degradation and economic goods and services, assessing the monetary value of environmental damage etc.

Course Content:

Module I: Introduction: definition and scope of environmental economics, economics and environment, environment inter-linkages, market failure and externality, accounting for the environment.

Module II: Resource economics: natural resources: types and classification, economics of natural resources exploitation, market structure and the exploitation of non-renewable resources, methods of valuation of environmental costs and benefits.

Module III: Economics & Environmental Management: WTO and international trade, environmental trade barriers, natural resource accounting, environmental communication, GRI reports, green marketing, eco-labeling, pollution control: basic approach to environmental policy and management, pollution tax: effluent charges and subsidies.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Syllabus - Semester Sixth

SUSTAINABLE DEVELOPMENT PRACTICES

Course Code: ENV2651 **Credit Units: 03**

Course Objective

Finding approaches to development that balance economic and social progress, address cultural differences, and respect ecological values and limits is the key to sustainable development. Moving towards this goal requires fundamental changes in human attitudes and behavior in our personal lives, in our community activities, and in our places of work. The success in this regard is critically dependent on education and training. This course will imbue students with respect for the conservation and sustainable use of resources, social equity, and appropriate development along with competencies to practice sustainable tasks at the workplace of today and tomorrow.

Course Content:

Module I: Introduction: Environment, sustainable development and globalization, millennium development goals, regional perspectives, challenges and environmental issues in India, sustainable development and Indian development policies, local environmental management and legislation.

Module II: Climate change and sustainable development: Climate change and sustainable development, climate change and forest management, sustainable consumption, strategies and issues, international environmental agreements and climate change, international environmental agreements and climate change.

Module III: Writing on environment: Environmentalism, environmental journalism and activism, media for environment, conventions and science article styles, fact-checking with sources, research and publication, green peace movement, UNEP, UNCED, WBCSD, WWF, WRI, GRI, and World Bank.

Examination Scheme:

Components	D	P	A	EE
Weightage(%)	15	10	5	70

D: Dissertation, P: Publication, A: Attendance EE: End Semester Examination