

Aims of B.Sc. (Hons.) Environmental Science

UGC DOCUMENT ON LOCF ENVIRONMENTAL SCIENCE, 2019

The aims of the B.Sc. (Hons) Environmental Science are to:

- Provide students with the scope to develop knowledge base covering all attributes of the environment and enable them to attain scientific/technological capabilities to find answers to the fundamental questions before the society with regards to human action and environmental effects with due diligence.
- Enhance the ability to apply this knowledge and proficiency to find solutions relating to environmental concerns of varied dimensions of present times
- Provide with a direction and technical capability to carry on lifelong learning and show teamwork and collaborative endeavour, and decision making
- Improve the employability of the graduates including the enhancement of self-employment potential and entrepreneurial aptitude, and fill the technical resource gap especially in the Indian context
- Help graduates appreciate requirement of framing environmental policy guidelines.
- Motivate graduates to appreciate that they are an integral stakeholder in the environmental management of India irrespective of their future jobs or working
- Environments in accordance of the provisions vide Article 48A (Directive Principles of State Policy) and Article 51A (g) (Fundamental Duties) of the Constitution of India.
- Help graduates to understand the concerns related to Sustainable Development Goals (SDGs) and the Indian obligations

Knowledge & Understanding

- *Demonstrate* extensive and systematic acquaintance of the disciplinary foundation in the various areas of Environmental Science.
- *insightfully* address the contemporary research and development at both national and international arena.
- *Understand and engage* in the field of Environmental Sciences and its allied areas.

Skills & Techniques

- *Show* ability to apply scientific knowledge & experimental skills in critical and organized manner for evaluation and elucidation of complex environmental problems and issues related to terrestrial ecosystems; physical environment; air, water, and soil contamination; human health hazards; biodiversity loss; food security and agricultural issues; solid waste management; and other specialized areas of electronics.
- *Demonstrate* the ability to identify the role of the scientific knowledge, experimental skills, scientific methods & tool in dealing with real life case specific issues and formulate sustainable solutions.
- *Exhibit* efficiency to model, simulates, and assesses the regional and global phenomenon and systems with both primary and secondary data sources.
- *Demonstrate* ability to facilitate technocrats and manufacturers to design and develop eco-friendly products and processes towards accomplishment of the sustainable development goals.

Semester I	Course Outcome
B Sc. Hons.	Two papers focus on the fundamental concept of environment, environmental components, environmental education movements, awareness, fundamentals of cell and genetics and taxonomy, concepts of ecology ecosystem and biomes. Students learn the holistic concept of environment, scope of environmental science, multidisciplinary nature of it.
GE 1	Students of other Hons stream of Sem I and Programme course of Sem V develops basic knowledge of environment, natural resources, current environmental problems
AECC	The Compulsory course on Environmental Science at Undergraduate level (AECC) aims to train students to cater to the need for ecological citizenship through developing a strong foundation on the critical linkages between ecology-society-economy in students of Sem I Hons students
Semester II	
B Sc. Hons.	Two papers build up sound knowledge level regarding environmental chemistry and physics, and their application in environmental related matters
GE 2	Students of other Hons stream of Sem II and Programme course of Sem VI develops basic knowledge of natural hazards, disaster management, waste management procedures, EMS from this paper
AECC	The Compulsory course on Environmental Science at Undergraduate level (AECC) aims to train students to cater to the need for ecological citizenship through developing a strong foundation on the critical linkages between ecology-society-economy in students of Sem I Programme students
Semester III (B Sc. Hons.)	Two theory papers and one practical paper ensures the information on earth processes, climate, natural resources, basic idea of Remote sensing, different kinds of energy resources and practical skill of analysis of water samples, plant samples, one

	SEC paper grows the concept of ecotourism and conservation of biological wealth
Semester IV (B Sc. Hons.)	Two theory papers build up the concept of Environmental toxicology, application of biotechnology and environment related laws and policies and one practical paper develops the ability for analysis of soil parameters and identification of aquatic flora and fauna, One SEC paper helps to focus on the analytical techniques, histological studies, staining and microscopy
Semester V (B Sc. Hons.)	One theory paper one practical paper and two elective DSE paper out of three DSEs, helps to develop sound knowledge on environmental pollution, water resources, social environmental problems and ability to analyze few more water parameters and cytological studies
Semester VI (B Sc. Hons.)	One theory paper one practical paper and two elective DSE paper out of three DSEs, helps to develop sound knowledge on Environmental economics, Environmental management, accounting auditing, processes to carry out dissertation or project work, basic concept of human health and disease, disaster and their management, Environmental statistics, engineering and modelling, in students.

Semester-I	Programme Outcome
CC 1 Fundamentals of Environment	Paper I deals with the holistic concept of Environment and society, multidisciplinary nature of the subject and its scope in future in the arena of job, need of environmental education, fundamental concepts of biological Cell, and basic idea of Gene
CC 2 Environmental Biology	Paper II deals with taxonomic classification, ecology, biomes, biotic communities and biogeochemical cycles
GE 1 Environment and Society	This paper inculcates the knowledge of environment, society, man-environment relation, natural resources and environmental pollution, environmental awareness, common social issues in students of Hons. streams other than Environmental Science
AECC (FOR HONS. STUDENTS) Environmental Studies	This compulsory paper has been introduced to produce general awareness regarding Environment, its problems, possible management processes, basic need for environmental studies, practical knowledge of environment related project works etc. among students of all Hons. Courses

Semester-II	Programme Outcome
CC 3 Environmental Chemistry	Paper CC 3 deals with the basic concept and application of General Chemistry, Biochemistry, aquatic and atmospheric chemistry and Basic knowledge of Green Chemistry in Environment related Matters
CC 4 Environmental Physics	Paper IV deals with the basic concept of radioactivity, thermodynamics, biophysics and analytical Physics regarding Environment related Matters
GE 2 Natural Hazards and	This paper introduces the understanding of natural hazards, disaster management, concept of waste, waste management, drinking water standards and industrial pollution management

Management	in students of Hons. streams other than Environmental Science
AECC (FOR PROGRAMME STUDENTS) Environmental Studies	Same as Before

Semester-III	Programme Outcome
CC 5 Earth Science	Paper 5 enriches the level of information about earth processes, Geological time scale, climatology, earth resources, hydrological cycle, aquifers, and soil characteristics as well as increases the skill of application of remote sensing among students.
CC 6 Environmental Resources	Paper 6 enhances the level of knowledge about natural resources, energy resources, concept of wealth and resource among students.
CC 7 Practical	Practical Paper 7 boosts the skill of application of methodologies for water parameter analysis, plant biochemical parameter analysis
SEC 1 Conservation and Ecotourism	Imparts basic Knowledge of ecotourism, types of tourism, its impact on environment and culture as well as conservation of wild life

Semester-IV	Programme Outcome
CC 8 Ecotoxicology and Biotechnology	This paper helps to build up sound knowledge level among students about toxicology, elementary idea about biotechnology and its recent application processes in environment related matters

<p>CC 9 Environmental Law, Policy and EIA</p>	<p>Enriches the store of information of regarding environment related laws, provision of environmental matters in Indian constitution, public policies, Environmental Impact Assessment, its goal etc.</p>
<p>CC 10 Practical</p>	<p>Enhances analytical skill for quantitative estimation of soil physico-chemical characteristics, Study of aquatic flora, fauna; ecosystem study</p>
<p>SEC 2 Analytical Techniques</p>	<p>Develops sound knowledge about histological as well as cytological techniques, microscopy etc. among students.</p>

Semester-V	Programme Outcome
CC 11 Environmental Pollution	This paper deals with the concept of pollution, pollutants, their types
CC 12 Practical	Imparts Practical knowledge to analyze few water parameters and learn to study air quality, watershed model etc.
DSE 1 Environmental Pollution and Monitoring Techniques	This paper deals with the concept of pollution, pollutants, their types, analytical techniques, basic concept of data collection.
DSE 2 Water Resources	It deals with water distribution pattern and quality of water resources
DSE 3 Social Environmental Issues	Grows understanding of social and environmental Issues , environmentalism, awareness, concept of sustainability among students

Semester-VI	Programme Outcome
CC 13 Environmental Economics and Management	This paper helps to grow sound knowledge about environmental economics, accounting auditing and management procedures of environmental problems among students
CC 14 Dissertation/Field Work and Computer	Imparts knowledge of project or dissertation work in the arena of environment among students, and also provides basic information on computer application

Application		
DSE 4 Disaster Management	This paper deals with the understanding of disaster and their management; students learn to grow ability for risk assessment	
DSE 5 Environmental Engineering, Modelling and Statistics	Enhances the knowledge of environmental statistics and modelling, measurement of central tendencies among students	
DSE 6 Environmental health and Stress Physiology	It imparts the concept of health, disease, health related programmes and common stress factors in plants physiology among students	
Semester-I	Programme Specific Outcome	
CC 1 Fundamentals of Environment	Unit 1	Imparts the knowledge about environmental components, scope and multidisciplinary nature of this subject
	Unit 2	Provides information on need of environmental education, environmental movements in India
	Unit 3	Build up basic concept on Prokaryotic and eukaryotic cells, their functions and structures
	Unit 4	Helps to grow sound knowledge of Concept of gene, gene interaction, Darwinism, genetic drift.
CC 2 Environmental Biology	Unit 1	This unit develops the knowledge of morphological and taxonomical studies of flora and fauna
	Unit 2	Introduces the concept of ecology, its classification, morphological, physiological and biochemical adaptation in plants, ecological factors
	Unit 3	It deals with the concept of ecosystem, its structural and functional classification, energy flow models
	Unit	Students gain information about population and

	4	community ecology and biogeochemical cycles
GE I Environment and Society	Unit 1	Develops knowledge of Different components of environment, environmental education and its scope and multidisciplinary nature, man-environment relation among students of other honours students.
	Unit 2	Imparts sound knowledge regarding resources, its type, classification, conservation; also deals with ecology and ecosystem in students of Hons. streams other than Environmental Science
	Unit 3	Build up sound understanding level of environmental pollution, sources, causes, global warming.
	Unit 4	It deals with environmental awareness and common social issues in India, environmental movements, role of IT on environment and health
AECC (FOR HONS. STUDENTS) Environmental Studies	Unit 1	Imparts the knowledge about the need of environmental education, scope and multidisciplinary nature of this subject
	Unit 2	Imparts sound knowledge regarding resources, its type, classification among all students of Semester 1 and 2
	Unit 3	It deals with the concept of ecosystem, its classification, ecological succession, energy flow models
	Unit 4	It provides sound knowledge about the value of biodiversity, threats, hotspot, mega biodiversity, conservation of biodiversity
	Unit 5	Builds up sound understanding level of environmental pollution, sources, causes, types ,hazards and pollution and disaster management
	Unit 6	Enriches the students with basic information regarding environment related laws, provision of environmental matters in Indian constitution, public policies, different protocols for protection of environment
	Unit	It enhances information status regarding human

	7	population, its explosion, human health related problems, and environmental movements
	Unit 8	Students learn to do project or field work on environment related area

Semester-II	Programme Specific Outcome	
CC 3 Environmental Chemistry	Unit 1	It deals with the basic concept and application of General Chemistry i.e., molarity, normality, metals, non metals hydrocarbon, free radicals etc.
	Unit 2	Biochemistry unit enhances the store of basic concept on carbohydrates, proteins, lipids, enzymes, DNA and RNA
	Unit 3	This unit informs students about chemical equilibrium, acids, bases, buffers
	Unit 4	Deals with solubility product, sedimentation, coagulation, filtration etc. processes
	Unit 5	Deals with atmospheric components, different gaseous constituents, photochemical smog
	Unit 6	Develops Basic knowledge of Green Chemistry and its application in Environment related fields, in waste management.
CC 4 Environmental Physics	Unit 1	Deals with the basic concept of radioactivity and application of radio isotopes in different fields, nuclear fission and fusion
	Unit 2	Increases understanding level of heat transfer processes and transport of atmospheric pollutants
	Unit 3	Develops knowledge of biophysics like bioenergetics of coupled reaction, ATP driven active transport, osmotic pressure in plant cells, plasmolysis, deplasmolysis etc.
	Unit 4	It enhances the knowledge level of analytical physics like Spectrophotometer, AAS, Flame photometry, Chromatography etc.

GE 2 Natural Hazards and Management	Unit 1	This paper introduces the understanding of natural hazards, types of hazards, causes of it in students of Hons. streams other than Environmental Science
	Unit 2	It develops the knowledge of disaster management, Vulnerability, risk management
	Unit 3	It builds up sound knowledge about drinking water standards, Environmental management, EMS, GAP, YAP in students of Hons. streams other than Environmental Science
	Unit 4	This paper introduces the understanding of concept of waste, waste management, industrial pollution management, biomedical waste management in students
AECC (FOR PROGRAMME STUDENTS) Environmental Studies	Same as before	

Semester-III	Programme Specific Outcome	
CC 5 Earth Science	Unit 1	Students develop concept on origin and evolution of earth, geological time scale, plate tectonic and continental drift
	Unit 2	Climate, climatic elements, its classification, spatial temporal pattern of climate develop an enriched store of knowledge about climatology in students
	Unit 3	This unit introduces sound information about mineral resources, water resources, hydrological cycle, aquifer, its types, artificial recharging of ground water to students
	Unit 4	This deals with soil formation, soil profile development ,physico-chemical properties of it and soil types found in India i.e., helps to grow a complete concept regarding soil

		among students
	Unit 5	It develops elementary idea of remote sensing, its processes, types of sensors, satellites, advantages and limitations of RS
CC 6 Environmental Resources	Unit 1	It deals with present status of natural resources like water, soil, food forest
	Unit 2	It tells about classification of energy resources
	Unit 3	This unit provides information on fossil fuels this composition, origin and classification
	Unit 4	It develops sound knowledge about different renewable energy resources
	Unit 5	It tells about different alternative energy sources at present day situation
	Unit 6	Students gain information about present and future energy resources and present energy use pattern of India
	Unit 7	Students learn from this unit about the biological wealth, its value, biodiversity, threats of it, types, hotspots, mega diversity, Red Data Book etc from this unit
CC 7 Practical	Unit 1	Students become skilful for analyzing water parameters and biochemical parameters from plant material
	Unit 2	Students learn to demonstrate mitochondria, chloroplast, staining of bacteria, zooplankton
	Unit 3	Students obtain sound knowledge on interpretation of satellite imagery
	Unit 4	Students gain information on local flora and fauna, and meteorological condition
SEC 1 Conservation	Unit 1	Imparts basic Knowledge of ecotourism, types of tourism, its impact on environment and culture as well as rural tourism, its economical benefits, types of alternative

and Ecotourism		tourism
	Unit 2	Students learn the concept of conservation of wild life, survey techniques of tiger, birds, elephants, insects, concept of zoo, nursery technology

Semester-IV		Programme Specific Outcome
CC 8 Ecotoxicology and Biotechnology	Unit 1	This unit helps to build up sound knowledge level among students about toxicology, its branches, mechanism of toxicity, dose-response relation, bio assay technique
	Unit 2	It enhances elementary idea about biotechnology, composting, vermicomposting and its recent application processes in environment related matters, in students
	Unit 3	It gives concept of biotechnological approaches like bio fertilizer, bio pesticide, biogas, bio fuels etc. among students
CC 9 Environmental Law, Policy and EIA	Unit 1	It Enriches the store of information regarding environment related laws, provision of environmental matters in Indian constitution, public policies, PILs, SPCB, CPCB etc. in students
	Unit 2	It develops sound information on Environmental Impact Assessment, its goals, techniques and methods etc.
CC 10 Practical	Unit 1	Enhances analytical skill for quantitative estimation of soil physico-chemical characteristics
	Unit 2	Students learn to identify aquatic flora, fauna, their characteristics
	Unit 3	Educational tour and local field visit develops the ability in students to study natural ecosystem practically
SEC 2 Analytical Techniques	Unit 1	Develops sound knowledge about histological as well as cytological techniques, fixation, fixatives, staining etc.
	Unit 2	Students learn about Components of microscope, types of it.

	Unit 3	Students learn to collect and preserve plankton, counting in Sedgwick Rafter cell
--	---------------	---

Semester-V	Programme Specific Outcome	
CC 11 Environmental Pollution	Unit 1	This unit deals with the fundamental concept of pollution, poverty and population
	Unit 2	It grows the knowledge about air pollution, indoor pollutants, El Nino, Photo chemical smog among students
	Unit 3	It grows the knowledge about water pollution, Eutrophication, lake acidification, salt water intrusion
	Unit 4	It grows the knowledge about soil pollution, its types sources, effects
	Unit 5	It grows the knowledge about thermal pollution effects of coal ash on environment
	Unit 6	It grows the knowledge about marine pollution, sources, effects on marine biota
	Unit 7	It grows the knowledge about vehicular pollution, characteristics of emission, its effects
	Unit 8	It grows the knowledge about fireworks pollution, characteristics, composition, effects and safety and laws
CC 12 PRACTICAL	Unit 1	Imparts Practical knowledge to analyze few water parameters and students learn cytological preparation of mitotic stages from onion root tip and meiotic stages from grasshopper testis
	Unit 2	Students learn to study air quality, watershed model etc.
	Unit 3	Students visit the industry or mining area or environmental laboratory to develop sound knowledge on this arena
DSE 1 Environmental Pollution and	Unit 1	This grow knowledge about radiation pollution its effects, nuclear accidents
	Unit	It develops sound knowledge on pesticide pollution,

Monitoring Techniques	2	elementary idea on IPM
	Unit 3	Students learn about metal pollution, its effect in soil, water and food
	Unit 4	Students learn analytical techniques and tools like titrimetry, gravimetry, LASER, RADAR, ultrasound
	Unit 5	It deals with bacteriological examination of water, plate count, test for coliform
	Unit 6	It imparts information on data collection and interpretation techniques, sampling, mean median mode etc.
DSE 2 Water Resources	Unit 1	it covers different sources of water and its distributions
	Unit 2	It is to enlighten different physic-chemical parameters and water biology
	Unit 3	Students learn about types and availability of water resources for sustainable water use
	Unit 4	It covers different sharing problems of India related to water distribution
DSE 3 Social Environmental Issues	Unit 1	Grows understanding of man environment relation, public awareness, environmentalism, Deep ecology, eco-feminism, environmental movements, population growth and its regulation
	Unit 2	Grows understanding of global environmental Issues, wasteland reclamation, environmental ethics, women and child welfare, Role of IT in environment and human health
	Unit 3	Enhances concept of sustainable cities, urban planning, wetland convention, CITES, Kyoto Protocol, Basal convention etc. in students

Semester-VI	Programme Specific Outcome	
CC 13 Environmental	Unit 1	This paper helps to grow sound knowledge about environmental economics, supply demand ,market, EKC,

Economics and Management		PPP, CBA, Valuation of environment
	Unit 2	Inculcate knowledge of accounting auditing its aims and objectives, financial and social accounting, LCA in students
	Unit 3	It deals with the management procedures of environmental problems, Agenda 21, ISO standard EMS, GAP, YAP, waste management, Biosafety protocols etc. with students
CC 14 Dissertation/Field Work and Computer Application	Unit 1	Imparts knowledge of project or dissertation work in the arena of environment among students. This unit helps to increase the inquisitiveness among students in problem findings and its possible management.
	Unit 2	This unit imparts skill in basic computer application like MS word, MS Excel, MS power point
DSE 4 Disaster Management	Unit 1	This unit deals with the understanding of disaster ,hazards, vulnerability, types, causes etc
	Unit 2	It develops basic skill of disaster management cycle and role of Govt. Non Govt. and State Govt. Agencies in disaster management
	Unit 3	Students learn the concept of risk, identification of hazards, problems related to toxic wastes, chemicals and radioactive substances disposal
DSE 5 Environmental Engineering, Modelling and Statistics	Unit 1	It ensures different modern aspects of possible pollution management options with advanced alternatives.
	Unit 2	Students may apply different modelling systems to know the status of environmental degradation
	Unit 3	Focuses on basic statistical approaches including modelling, measurement of central tendencies.
	Unit 4	Enhances the knowledge of environmental statistics and its application in environmental fields.
DSE 6 Environmental health and Stress Physiology	Unit 1	Students learn the concept of basic disease, and epidemiology
	Unit 2	Students get their knowledge about immunology, and mechanism of disease causing agents in our body
	Unit 3	It covers basic knowledge of family planning and world health conditions
	Unit 4	It is helpful to know about different environmental changes and its probable impacts on human health and biochemical changes of plants

