COURSE OUTCOME

(ENVS)

	Semester	Course Code	Course Title	Outcome
ENVS (Honours)	**Semester-I**	**ENVS-H-CC-L -01** **(Theory)**	**Earth and Earth Surface Processes**	To understand the basic structure and composition of the earth and explore various surface processes and their impact and role in living systems. It will also deal with the interactive processes in the inner as well as outer Earth's surface
		ENVS-H-CC-P -01 **(Practical)**		1. Hand specimen: rocks and minerals. 2. Microscopic studies of thin section of rock and minerals. 3. Topographical sheet interpretation.
		ENVS-H-CC-L -02	**Environmental Chemistry and Environmental Physics**	This paper aims to build conceptual understanding of students by exposing them to the basic principles behind various environmental processes. The paper has been divided into two sections, with the view to introduce students to the concepts of chemistry and physics associated with particle movement, chemical processes and pollutant chemistry
		ENVS-H-CC- P-02		1. Preparation of primary and secondary standard solutions.

		(Practical)		2. Estimation of metals using standard potassium dichromate/ potassium permanganate solution. 3. Measurement of physicochemical parameters of soil and water samples (pH, conductivity, hardness, alkalinity), soil organic matter. 4. Field visit to renewable/ non-renewable energy plants.
		ENVS-H-GE-L -01	**Environment and Society**	The course examines the relationship between the environment and society enabling the students to understand and appreciate the role played by environment, society, and, their interface in shaping environmental decisions. The students will be enabled to think critically on environmental issues.
		ENVS-H-GE- P-01 **(Practical)**		Field survey based analysis, exercise and interpretation: 1.Interactive session with community for awareness development and survey documentation (Socio-economic/socio cultural/ and other environmental perspectives)
	Semester-II	**ENVS-H-CC-L-03**		The paper introduces students to the hydrological cycle, properties of water, physicochemical and biological water quality assessment and indices, types of water resources, their use and management. It will also highlight the problems associated with water shortages in India and

			Water and Water Resources	familiarizes students with case studies on international and national conflicts on water.
		ENVS-H-CC- P-03 (Practical)		1. Field study related to rainwater harvesting / groundwater wells and document preparation. 2. Field visit to wetland and document preparation. 3. Water demand in domestic/ agricultural fields/ industrial areas through preparation of survey sheets followed by documentation.
		ENVS-H-CC-L-04	**Land, Soil Conservation and Management**	To understand the fundamentals of land and soil degradation. Each unit covers a range of topics, which will help students develop basic understanding of properties of soil and how the quality of land and soil degrades due to anthropogenic activities.
		ENVS-H-CC- P-04 (Practical)		1.Determination of soil organic matter, nutrients (N, P, K), Soil water holding capacity, Soil texture analysis. 2. Soil profile study. 3. Identification of degraded land using remote sensing data and topographical sheets.

		ENVS-H-GE-L-02	**Wildlife Management**	This paper deals with the conflicts that have arisen as a result of shrinkage of wildlife habitats and the same being shared by human communities. It raises questions about the moral obligations of humans, need for conservation, and social impacts of conflicts. The paper aims at introducing the students to the scientific and social perspective of conservation.
		ENVS-H-GE-P-02 (Practical)		1.Orientation to field biology and natural history. Observations and collection of study material, wildlife signs and evidences. 2.Study and identification of fish and insects commonly used in any study area. 3.Visit to wildlife sanctuary/National Park/Biosphere reserve to make an appraisal of the habitat, wildlife profile and threats. 4.Visit to Zoo and Museum followed by document preparation.
	Semester-III	**ENVS-H-CC-L-05**	**Ecology and**	The basic understanding of ecosystem and its structural and functional aspects. It will explore the interconnectedness among all the biotic and abiotic components of environment and the dynamic nature of the ecological processes in maintaining equilibrium in nature

		ENVS-H-CC- P-05 **(Practical)**	**Ecology and Ecosystems**	1. Qualitative and quantitative analysis of planktons of aquatic systems. 2. Determination of species, dominance and frequency using quadrate/ plot method. 3. Determination of dissolved oxygen, free carbon dioxide and primary productivity of water samples collected from aquatic ecosystems. 4.Ecological field visit: pond/forest/river/wetland or other ecosystem.
		ENVS-H-CC-L-06 **ENVS-H-CC- P-06** **(Practical)**	**Biodiversity and Conservation**	To understand and appreciate various concepts and issues concerning biodiversity and conservation at local, regional and global levels. The course will attempt at encouraging students to appreciate the paradigm "think globally, act locally" for a sustainable common future of human kind. Biodiversity measurement techniques: Biodiversity richness and diversity indexes. 1.IUCN red list categorisation- Guideline criteria. 2.Ecorestoration – site visit.
		ENVS-H-CC-L-07		To understand the dynamics of atmospheric processes, which include its composition, meteorological phenomena and atmospheric chemistry. The paper also highlights the anthropogenic intervention in 'anthropocene', which has led to global climate change. The paper also explores effects of global changes on human communities and initiatives taken at global and regional levels to combat

			Atmosphere and Global	them.
		ENVS-H-CC- P-07 **(Practical)**	**Climate change**	1.Preparation of meteorological charts, graphs and windrose, 2. Handling of meteorological data recording instruments (Rain gauge, Anemometer, wet bulb dry bulb thermometer, Barometer) and their uses. 3. Field visit to meteorological centre.
		ENVS-H-GE-L-03	**Gender and Environment**	The paper is designed to expose students to the concept of gender in society and its relevance in the environmental context. The principal objective of the course is to enable students to examine environmental issues from a gender-sensitized perspective.
		ENVS-H-GE-P-03 **(Practical)**		Field survey based analysis, exercise and interpretation 1. Assignment on gender/environment: gender equity issues in rural and urban society. 2. Field visit and evaluation of gendered responses to environmental degradation.
		ENVS-H- SEC-01a	**1a)Remote Sensing, Geographic Information System (GIS) and Application**	This course introduces the students to various computer-based and statistical methods used for study and management of natural resources and the environment. The students are expected to learn about remote-sensing techniques, physical principles, sampling, statistics and image-analysis methods.

		ENVS-H- SEC-01b	**1b)Occupational Health and Environmental Safety**	This course introduces the students to acquire knowledge about various occupational diseases and safety measures with particular attention to accident prevention in work place, safety education and training.
	Semester-IV	**ENVS-H-CC-L-08**	**Systematics and Biogeography**	To understand principles and applications of classical and modern day systematics to classification of living organisms, develop understanding of historical and contemporary patterns of distributions of organisms, and design effective conservation strategies using biogeographic theories in anera of global change and large scale human induced degradation.
		ENVS-H-CC- P-08 **(Practical)**		1. Demonstration of typification procedure. 2. Field visit for floral and faunal assessment of an area. 3. Criteria used for designation of a protected area- preparation of worksheet. 4. Study of invasive species distribution and documentation.

		ENVS-H-CC-L-09	**Natural Resources Management and Sustainability**	This paper takes an objective view of the nature of Earth's resources, their generation, extraction and impact of human activities on earth's environment. The students are expected to understand effective management strategies. It aims to provide an idea of effective management strategies and a critical insight of the major sustainability issues.
		ENVS-H-CC- P-09 (Practical)		1.Forest area mapping techniques. 2.Water bodies mapping techniques. 3. Water audit of college/ industry. 4.Energy audit of college/ industry. 5.Environmental audit of college. 6.Visit to mine area, forest area and aquaculture farm
		ENVS-H-CC-L-10	**Environmental Pollution and Human Health**	To understand different aspects of environmental contamination, which have adverse effects on human health. It will lay emphasis on understanding mechanisms of pollutants impacting human health by developing an understanding of different types of pollutants, their sources and mitigation measures. The students will also be introduced to the concept of permissible limits.
		ENVS-H-CC- P-10		1.Estimation of Ground & surface water quality parameters (COD, BOD, DO, nitrate, fluoride,

		(Practical)		arsenic, chlorine, cadmium, mercury, pesticides). 2. Estimation of air quality parameters (NOx, SOx, SPM). 3.Field visit to effluent treatment plants (ETP)/ sewage treatment plants (STP). 4.Total coliform load of water sample. 5.Noise monitoring (Leq)
		ENVS-H-GE-L-04	**Green Chemistry, Green Technology and Environmental Applications**	This paper introduces students to the concept of green technology, its goals and advantages. It also highlights potential role of green technologies in realizing the goal of sustainable development and focuses on community participation to tap the economic benefits associated with switching to green technologies.
		ENVS-H-GE-P-04 **(Practical)**		Field survey based analysis, exercise and interpretation 1.Worksheet preparation of schemes of different green processes and practices based on industry visit. 1.Visit to biofertilizer, vermicomposting units, organic agriculture farms and report preparation. Suggested Readi

		ENVS-H- SEC-02	**2a)Environment Impact and Risk Assessment**	This course recognizes the growing need of industry to anticipate and incorporate environmental concerns and risks while developing large-scale projects. The course emphasizes on the contemporary tools and techniques to assess various environmental impacts and outlines various management options needed to mitigate these risks.
			2b)Environmental Quality Monitoring and Assessment	This paper deals with environmental quality monitoring and assessment. An attempt will be made to have a compressive idea about different aspects of environmental contamination, with special emphasis on air, water, soil and noise qualities, perturbation of which may have adverse effects on environmental and human health. It will lay emphasis on understanding mechanisms of pollutants impact on human health by developing an understanding of different types of pollutants, their sources and mitigation measures. The students will also be introduced to the concept of standards and permissible limits
		ENVS-H-CC-L-11		Understanding the application of biotechnological know-hows in tackling environmental problems. It starts with basic knowledge about molecular biology and later links to application based processes and techniques.
		ENVS-H-CC- P-11 (Practical)		1. Isolation and characterisation of soil bacteria. 2. Gram staining of bacterial sample. 3. Enumeration of heterotrophic bacteria from water and soil samples (Spread plate/pore plate technique).

				4.Determination of chlorophylls, enzymes (catalase, peroxidase and ascorbic acid of plant samples). 5. Bioassay of toxic compounds by enzyme assay or seed germination test. 6. Estimation of carbohydrate, protein and DNA. 7.Study of mitotic and meotic stages (*A. cepa* and grasshopper testis or pollen).
		ENVS-H-CC-L-12	**Evolutionary Biology**	This paper introduces students to the fundamentals of ecology and evolutionary biology. Each unit covers vast range of topics, which will help the students to develop basic concepts of ecology and evolutionary biology.
		ENVS-H-CC- P-12 (Practical)		Field survey based analysis, exercise and interpretation
		ENVS-H-DSE-L-01	**1a)Energy and Environment** **Or**	Understanding of the existing energy resources, issues related to energy and the environment, challenges and possible paths to sustainable energy generation and use.

	Semester-V		**1b)Ecotoxicology and Environmental Health**	To understand the basic concepts of toxicology, categories of toxicants, their sources, action and effects. It will also consider the preventive and curative measures to reverse toxic impact and maintenance of environmental health.
		ENVS-H-DSE-P-01a & 01b (Practical)		a). Field survey based analysis, exercise and interpretation b). Toxicity bioassay through germination (LD_{50}). • Toxicity bioassay through microbial test. • Epidemiological survey in arsenic affected areas
		ENVS-H-DSE-L-02	**2a)Environmental Economics**	Understanding the fundamentals of environmental economics. It covers some basic concepts of economics to familiarize students with absence of market, demand and supply in nature. Each unit covers a range of topics, which will help students to develop modern concepts of environmental economics and its importance in conservation of biodiversity and ecosystems through understanding of economic costs associated with these.
			2b) Waste and Waste water Management	This paper throws light on the current scenario of waste and waste water generation, problems in handling and management. It also deals with the different governmental policies for proper management in order to minimize their effect on environment.
			Or	

		ENVS-H-DSE-P-02a & 02b **(Practical)**		a). Field survey based analysis, exercise and interpretation. b). Physico-chemical characterisation of waste water (TSS, TDS, oil & grease, phenolics). • Sludge characterisation (moisture content, ash, VOC, metal etc.). • Visit to waste disposal sites and report preparation.
	Semester-VI	**ENVS-H-CC-L-13**	**Environmental Legislation and Policy**	To understand the legal structure of India and fundamentals of environmental legislation and policy making. Each unit will help the students to develop basic concepts of environmental legislation and policy making in India and around the world.
		ENVS-H-CC- P-13 **(Practical)**		1. Field visit for assessment of environmental policy adoption, environment safety policy adoption in industry and document preparation. 2.Survey on perception of environmental laws in communities/ societies and document preparation.
		ENVS-H-CC-L-14	**Urban Ecosystems**	To examine the existing environmental issues, conflicts and their potential role in urban development. It beholds importance as interaction between urban society and its environment transpires in governance and policy decisions. It also aims to address key challenges posed by increasing development to far-reaching goal of sustainability in urban areas.
		ENVS-H-CC- P-14		Field survey based analysis, exercise and interpretation

		(Practical)		Field survey based analysis, exercise and interpretation
		ENVS-H-DSE-L-03	**3a)Natural Hazards and Disaster Management**	To understand the various aspects of environmental hazards, their causes, classifications, and impacts. It also focuses on the management strategies and governmental action plan to mitigate and prepare for such hazards.
			3b)Instrumental Techniques for Environmental Analysis	This paper introduces the students to various instrumental techniques for environmental analysis along with their principle and applications. An attempt will be made to have a compressive idea about various sampling techniques along with sample preparation. The students will also be introduced to the concept of radioactivity detection techniques and their applications.
		ENVS-H-DSE-P-03a & 03b **(Practical)**		a). Field survey based analysis, exercise and interpretation. b). Field survey based analysis, exercise and interpretation 1. Principles and application of instruments and document preparation. 2. Demonstration of selected instruments and document preparation.

		ENVS-H-DSE-D-04	**Dissertation**	