DEPARTMENT OF ENVIRONMENTAL SCIENCE

B.Sc. (H) ENVIRONMENTAL SCIENCE
Category-I

DISCIPLINE SPECIFIC CORE COURSE – 1: ENVIRONMENTAL AND EARTH SURFACE PROCESSES

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite o f the course (if any)
		Lecture	Tutorial	Practical/ Practice		
ENVIRONMENTAL AND E ARTH SURFACE PROCESSES	4	2	0	2	Class X II pass	NIL

Learning Objectives

•Introduce students to the basic structure and composition of the Earth
•Explore various surface processes and their impact on and role in living systems
•Analyse interactive processes in the inner as well as outer Earth's surface

Learning outcomes

After this course, students will be able to learn the following skills.
•Acquire environmental field mapping skills to identify rocks, landforms, soils, and minerals
•Analyse surface and near-surface processes and products;
•Develop the current status of earth's processes while correlating it with global changes through time.
•Correlate landform and environmental conditions based on the evolution of the earth
•Relate and interpret the geological history of an area based on rock analyses
•Use satellite data to interpret Earth's geology or landscape

SYLLABUS OF DSC-1

UNIT – I HISTORY OF EARTH (6 hours)
Solar system formation and planetary differentiation; formation of the Earth: formation and composition of core, mantle, crust, atmosphere and hydrosphere; Geological time scale and major changes on the Earth's surface; Holocene and the emergence of humans, role of humans in shaping landscapes; development of cultural landscapes.

UNIT – II EARTH SYSTEM PROCESS (8 hours)
Movement of lithosphere plates; mantle convection and plate tectonics, major plates and hot spots; sea floor spread; earthquakes; volcanic activities; orogeny; isostasy; gravitational and

magnetic fields of the earth; continental drift and present-day continents, paleontological evidences of plate tectonics; continental collision and formation of the Himalaya and mountains.

UNIT – III MINERALS AND ROCKS (8 hours)

Minerals and important rock forming minerals; rock cycle: lithification and metamorphism; Three rock laws; rock structure, igneous, sedimentary and metamorphic rocks; weathering: physical, biogeochemical processes; erosion: factors and agents of erosion; rivers and streams, glacial and aeolian transportation and deposition of sediments by running water, wind and glaciers

UNIT IV– EARTH SURFACE PROCESSES (8 hours)

Atmosphere: evolution of earth's atmosphere, composition of atmosphere, physical and optical properties, circulation; interfaces: atmosphere–ocean interface, atmosphere land interface, ocean–land interface; land surface processes: fluvial and glacial processes, rivers and geomorphology; types of glaciers, glacier dynamics, erosional and depositional processes and glaciated landscapes; coastal processes

Unit V: IMPORTANCE OF BEING A MOUNTAIN (8 hours)

Formation of Peninsular Indian Mountain systems - Western and Eastern Ghats, Vindhyas, Aravallis, etc. Formation of the Himalaya; development of glaciers, perennial river systems and evolution of monsoon in Indian subcontinent; formation of Indo-Gangetic Plains, arrival of humans; evolution of Indus Valley civilization; progression of agriculture in the Indian subcontinent in Holocene.

Practical component (if any) - (60 hours)

1. Field survey and learning what and how are to be collected, observed, and recorded as a young field environmental geologist.
2. Field visit to identify natural agents derived landform and geomorphic features.
3. Field surveys and learning indicators of geomorphology, external features, texture, colour, mineral composition, and minerals to identify the rock types
4. Mapping of igneous, sedimentary, and metamorphic rocks and drawing sketches to highlight important features of different rock types
5. Megascopic identification of mineral samples: bauxite, calcite, chalcopyrite, feldspar, galena, gypsum, hematite, magnetite, mica, quartz, talc, tourmaline;
6. Estimate the relative density of soil and conduct sedimentation analysis using hydrometer method.
7. Determine plastic limit of soil and determine soil permeability
8. Study any glacier, its flow direction, identification of glacial erosional and depositional landforms, and analysis.
9. Read, prepare and interpret geological maps to analyze petrographical and structural features.
10. Read and interpret topographical maps, aerial photographs, satellite imagery, and digital elevation models for the earth's surface features
11. Locate the epicenter of an earthquake
12. Interpret earth's history using igneous and sedimentary rock

Suggestive readings

- Bridge, J., & Demicco, R. 2008. Earth Surface Processes, Landforms and Sediment Deposits. Cambridge University Press.
- Cronin, V.S., 2018. Laboratory Manual in Physical Geology. Pearson.
- Keller, E.A. 2011. Introduction to Environmental Geology (5th edition). Pearson Prentice Hall.
- Leeder, M., Arlucea, M.P. 2005. Physical Processes in Earth and Environmental Sciences. Blackwell Publishing.
- Ludman, A. and Marshak, S., 2010. Laboratory manual for introductory geology (p. 480). WW Norton & Company.
- McCann, T., 2021. Pocket Guide Geology in the Field. Springer, Bonn, Germany.
- Pelletier, J. D. 2008. Quantitative Modeling of Earth Surface Processes (Vol. 304). Cambridge: Cambridge University Press. Chicago.
- Rutford, R.H., and Carter, J.L., 2018. Zumberge's Laboratory Manual for Physical Geology, Sixteenth Edition, Mc-Graw-Hill Education, New York, USA.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE – 2: ENVIRONMENTAL PHYSICS

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
ENVIRONMENTAL PHYSICS	4	2	0	2	Class X II pass	NIL

Learning Objectives

- Build conceptual understanding of the environment by understanding the underlying principles of physics governing environmental processes
- Develop perspective on the concepts of physics associated with the movement of particles,
- chemicals, and gaseous across the environmental compartments
- Gain insights into physics of plant-soil-water interface determining ecosystem processes

Learning outcomes

After this course, students will be able to

• Apply principles of physics to manage soil, water, and plant growth, especially in extreme environment