

Discipline Specific Elective: DSE-1: Earth Surface Processes (L3, P1) or DSE-2: Surveying Techniques (L3, P1)

Or

One GE from GE pool (GE-3): Fossils and Applications (L3, P1)

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		
DSE-1 Earth Surface Processes (L3, P1)	4	3	0	1	Class 12 th with Science	Studied Earth System Science and Structural Geology or Equivalent

Learning Objectives

The course “Earth Surface Processes” is intended to provide a holistic approach to study the surficial features and the processes with emphasis on links and feedbacks between its components. The subject will serve as a dynamic and physical based account of the processes at planets surface with an integrated approach involving the principles of geomorphology and sedimentology.

Learning outcomes

After going through this course students will have sound idea about the Earth’s Energy Balance, Hydrological cycle, Topography and bathymetry. This will enable them to learn about the sedimentary flux: origin, transport and deposition and the geomorphic and sedimentological processes related to fluvial, coastal, aeolian, and glacial regimes. Students will also appreciate about the environmental changes and its impact on surface processes and landforms.

SYLLABUS OF DSE-1

UNIT – I (9 Hours)

Detailed contents

Introduction to Earth Surface System. Earth’s energy balance, hydrological cycle, carbon cycles, heat transfer, topography and bathymetry.

UNIT – II (9 Hours)

Detailed contents

Earth's critical zone, weathering and formation of soils, sediment routing systems, sediment and solute in drainage basins, importance and impact of climate change and tectonics on sediment yield and transport.

UNIT – III (9 Hours)

Detailed contents

Fluid and sediment dynamics and transport: Natural substances, settling of grains, types of flows and boundary separation layers, sediment continuity, modes of sediment transport, bedforms and stratification.

UNIT – IV (12 Hours)

Detailed contents

Sediment transport and deposition associated with fluvial, aeolian, glacial, coastal and marine regimes.

UNIT – V (6 Hours)

Detailed contents

Impact of environmental changes on Earth Surface processes.

Practical Component- (30 Hours)

Exercises on flexural isostasy.

Exercises related to settling of sediments.

Sediment flux exercises.

Preparation of river profiles (Hack Profile, calculation of SL index, Ksn).

Exercises related to fluvial geomorphology.

Exercises on rate of uplift and incision.

Essential/recommended readings

P. A. Allen, 2009, Earth Surface Processes. Wiley

John Bridge and Robert Demicco: Earth Surface Processes and Landforms and Sediment Deposits

Suggestive readings

P. A. Allen, 2009, Earth Surface Processes. Wiley

John Bridge and Robert Demicco: Earth Surface Processes and Landforms and Sediment Deposits

Bloom, A.L., 1998. Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Pearson Education

Summerfield, M.A., 1991. Global Geomorphology, Prentice Hall.

Jon D.Pelletier.2008. Quantitative Modelling of Earth Surface Processes. Cambridge University Press

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

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		
DSE-2 Surveying Techniques (L3, P1)	4	3	0	1	Class 12 th with Science	Studied Earth System Science and Structural Geology (or equivalent)

Learning Objectives

The course “Surveying Techniques” is intended to teach the students basic techniques to operate modern surveying instruments and develop skill to carry out topographic mapping.

Learning outcomes

After going through this course students will have sound idea about the Surveying Method and various types mapping skills. For examples: (i) Principles of surveying techniques, (ii) Operate modern surveying instruments, (iii) Prepare maps

SYLLABUS OF DSE-11

UNIT – I (9 Hours)

Basics of Surveying: Fundamental concepts and principles; Types of surveys; Classes of surveys; Surveying Instrumentation; Units of measurement; Locating position; Errors.

UNIT – II (12 Hours)

Levelling – Theory and Methods: Coordinate system; Geoid; Datum; Curvature and refraction; Categories of levels; Traversing; Differential levelling; sources of error in levelling; Distance measurement; Angles, azimuth and bearings.

UNIT – III (12 Hours)

Surveying Techniques: Principles and use of – Chain survey, Plane Table survey, Compass survey, Dumpy level survey, Theodolite survey, Total Station survey, Global Positioning System (GPS)

UNIT – IV (12 Hours)

Map Preparation: Introduction to QGIS; Map design; Map layout; Basic map plotting procedures; Plotting contours; Lettering; Cartographic map elements; Sources of error in mapping.

Practical Component- (30 Hours)

Chain survey
Plane Table survey
Total Station survey
Survey using GPS
Survey using Drone (if drone is available)
Map making

Essential/recommended readings

Surveying – Vol – I – By S.K.Duggal, Tata McGraw Hill Book Co.
Surveying – Vol – II – By S.K. Duggal, Tata McGraw Hill Book Co

Suggestive readings

Surveying – Vol – I – By S.K.Duggal, Tata McGraw Hill Book Co.
Surveying – Vol – II – By S.K. Duggal, Tata McGraw Hill Book Co

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

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		
GE-3 Fossils and Applications (L3, P1)	4	3	0	1	12 th Pass (with science stream)	Nil

Learning Objectives

To provide some basic knowledge on fossils, their preservation in rocks and different groups of invertebrate, vertebrate and plant fossils. To impart knowledge on the utility of some of these fossils in determining the relative age of sedimentary rocks and implication in palaeoecological, palaeoenvironmental, palaeobiogeographical reconstruction. To equip the student with basic understanding of the role of fossils in hydrocarbon exploration.

Learning outcomes

Student will learn about different types of life forms that existed in the geological past. Students will learn about the evolutionary rates of certain important fossil groups and their role in dividing the rocks into distinctive units based on their stratigraphic ranges. Learn how fossils can be used in understanding the past environments, ecosystems, climate and distribution of land and sea. Student will also learn about the role of fossils in the exploration of fossil fuels.