Common Pool of Discipline Specific Electives

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-3 **River Science (L3, P1)**	**4**	**3**	**0**	**1**	**12th pass with science**	**Studied Earth System Science and Structural Geology or Equivalent**

Learning Objectives

This course on river science is intended to provide student with basic science and understanding of the life cycle of a river especially in relation to societal development. It is to provide them knowledge and comprehension about the processes of erosion and transportation of sediments and its connection with the landforms.

Learning outcomes

After going through this course, students will be able to gain a thorough understanding of the evolution of a river. They will develop an understanding of stream hydrology concepts such as river hydrographs, river discharge, and flood frequency. Students will be able to comprehend the movement of sediments from source to sink. Students will develop the basic skills to identify different types of drainage networks and the impact of catchment morphometry and shape on the hydrological parameters of the river. Students will be able to analyze river profiles and explain their anomalies. They will be able to calculate the stream power and perform flood frequency analysis.

SYLLABUS OF DSE-3
Theory (45 hours)

UNIT – I (9 Hours)
Detailed Content
Stream hydrology: Basic stream hydrology. Physical properties of water, sediment and channel flow. River discharge, River hydrographs (UH, IUH, SUH, GIUH) and its application in hydrological analysis; Flood frequency analysis

UNIT – II (9 Hours)
Detailed Content
River basin: Sediment source and catchment erosion processes; Sediment load and sediment Yield; Sediment transport processes in rivers; Erosion and sedimentation processes in channel.

UNIT – III (9 Hours)
Detailed Content
Drainage: Drainage network; Quantitative analysis of network organization – morphometry Role of drainage network in flux transfer. Evolution of drainage network in geological time scale.

UNIT – IV (9 Hours)
Detailed Content
Rivers in time and space: River diversity in space, Patterns of alluvial rivers - braided, meandering and anabranching channels, Dynamics of alluvial rivers; Channel patterns in stratigraphic sequences. Different classification approaches in fluvial geomorphology and its applications.

UNIT – V (9 Hours)
Detailed Content

Channels and Landscapes: Bedrock channels, Bedrock incision process; River response to climate, tectonics and human disturbance; Bedrock channel processes and evolution of fluvial landscapes. Fluvial hazards: Integrated approach to stream management. Introduction to river ecology.

Practical Component- (30 Hours)
Exercises based on River visit during weekend, Stream power calculation, Longitudinal profile analysis, Hydrograph analysis, and Flood Analysis

Essential/Recmmended readings
Fryirs and Brierly (2013) Geomorphology and river management. Wiley-Blackwell Pub.
Julien, P.Y. (2002) River Mechanics. Cambridge University Press.

Recommended readings
Bridge, J.S., (2003) Rivers and Floodplain: Forms, Processes and Sedimentary Record. Blackwell Science.
Gibling, M.R., (2021) River Planet. Dunedin Press.
Wohl, E., (2010) Mountain Rivers Revisited. American Geophysical Union.

OR

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE-3 **Introduction to Geophysics** (L3, T1)	**4**	**3**	**1**	**0**	**12th pass with science**	**Studied Earth System Science and Structural Geology or Equivalent**

DSE-3:
Introduction to Geophysics (L3, T1)
Credit: 4
Theory (45 hours), Tutorial (30 hours)

Learning Objectives
This course on introduction to geophysics is intended to provide basic scientific knowledge to students to understand the interrelationship of geology and geophysics, which is essential to know the geodynamic behavior of the Earth and its interior. Students will be taught about the basic concepts in geophysics, different types of geophysical exploration methods, and geophysical anomalies to appreciate the geodynamics of the Earth and its resources.

Learning outcomes
After going through this course, students will be able to have an elementary knowledge and comprehension about the geophysical methods and their application to understand and explore Earth and its interior. They will also develop basic skills about the geophysical anomalies and their relation to geological process that are essential for any detailed exploration activity.

Theory (45 hours),

UNIT – I (9 Hours)
Detailed content
Basic concepts of geophysics: Interrelationship between geology and geophysics, Role of geology and geophysics in explaining geodynamical features of the earth.