

Paper 7: Geomorphology

Topic

Introduction to Geomorphology (4 lectures)

History and Philosophy of Geomorphology; Why is this important?

Some key concepts and guiding principles

What drives geomorphic processes? Endogenic and Exogenic processes

Establishing timing: rates of processes and ages of landscapes

Whole Earth Morphology (2 lectures)

- Geoid
- Global Hypsometry

Major Morphological features

Large Scale Topography (4 lectures)

- Ocean basins
- Plate tectonics overview
- Large scale mountain ranges (with emphasis on Himalaya)
- Mantle response times: geomorphology as a probe of mantle rheology
- Mantle flow and its influence on geomorphology

Atmospheric Processes and geomorphology

Special class: Presentations by students belonging to different geomorphic provinces of India on characteristics of geomorphology of their respective areas

Weathering and associated landforms (3 lectures)

Hillslopes

Glacial, Periglacial processes and landforms (4 lectures)

Fluvial processes and landforms (6 lectures)

The geomorphology of big floods

Aeolian Processes and landforms (4 lectures)

Coastal Processes and landforms

One-day weekend field trip to view geomorphology of Delhi. Submit field report as assignment within one week of field trip.

Landforms associated with igneous activities (2 lectures)

Endogenic – Exogenic interactions

- Rates of uplift and denudation (4 lectures)
- Tectonics and drainage development
- Sea-level change

Long-term landscape development

Overview of Indian Geomorphology (3 lectures)

Extraterrestrial landforms

12 rounds of student presentations will be arranged in Groups on different topics covered under Theory

Practicals

(12 lectures)

How to read topographic sheet? Concept of scale

Preparation of a topographic profile

Preparation of longitudinal profile of a river; Preparing Hack Profile; Calculating Stream-length gradient index

Morphometry of a drainage basin; calculating different morphometric parameters

Preparation of geomorphic map

Interpretation of geomorphic processes from the geomorphology of the area

Proposed projects (Extendable)

- 1) Mapping of Mars landforms from the photograph taken by the NASA's Mars rover Curiosity.
- 2) Deriving morphometric parameters of a small basin and its interpretation.
- 3) Making a collage of photographs showing various landforms in Delhi supplemented with a small write-up on the geomorphology of Delhi.
- 4) Comparing Google images of two different time periods of any part of the country and preparing a change detection map.
- 5) Writing algorithm for automated extraction of any landform from the DEM.
- 6) Extracting photograph from an old Bollywood film and carrying out change detection by comparing it with present day photograph of the same area.

Suggested Readings

1. Global Geomorphology: An introduction to the study of landforms
Michael A. Summerfield Published by Pearson Education Limited 1991
2. Geomorphology: The Mechanics and Chemistry of Landscapes
Robert S. Anderson and Suzanne P. Anderson Published by Cambridge University Press 2010
3. Geomorphological Techniques
Andrew Goudie et al., Published by Unwin Hyman 1990
4. Introduction to Geomorphology
Vishwas S. Kale and A. Gupta Published by Orient Longman 2001
5. Fundamentals of Geomorphology
Richard J. Huggett Published by Routledge 2007