

Physical Geology

1.1. Course Number: GE111

1.2. Contact Hours: 3-0-0

Credits: 9

1.3. Semester Offered: 1st Year-Even

1.4. Prerequisite: None

1.5. Syllabus Committee Members: Dr. Alok Kumar Singh & Dr. Hemant Kumar Singh

2. Objective: The course aims to understand origin of Earth, interior structure Earth, various endogenic and exogenic processes that shape landforms on earth, Earth tectonics, various landforms form due to external agency like wind, river, glacier, underground water, sea, and lakes.

3. Course Content: Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topics	Lectures
1	Introduction to Physical Geology	Definition of Geology – Basic assumptions of Geology – Its relationship with other sciences – Branches of Geology -Aim and Applications of Geology, Earth: shape Its shape, size, and density – movement and their effects. Origin and age of earth, Interior of the earth, Geological processes – exogenic and endogenic, Earthquakes (Causes and kinds of earthquake waves and mode of propagation, intensity of earthquakes, Richter scale – seismograph and seismogram. Effects of earthquakes), volcanism and its landform, Definition of weathering – Types of weathering of rocks – physical and chemical; Definition of erosion and denudation, agents of erosion, cycle of erosion; erosion, transportation, and deposition; Earth Tectonics: Definition of diastrophism, epeirogeny and orogeny – mountains, Geosynclines. Basic concept of Isostasy, continental drift, sea floor spreading, and plate tectonics.	15
2	Wind and Rivers	Wind: Development of characteristic features by wind (arid cycle) erosion and deposition –pedestal rock-mushroom topography-Inselberg – Ventifacts – locus – sand dunes. Application of landform by wind action; River: Erosion, Transportation, and deposition of river (fluvial) cycle in different stages– Development of typical landforms by river erosion and deposition. V-shaped valley, Waterfall, alluvial fans, natural levees, ox-bow lakes, flood plains, peneplain and deltas, Types of rivers, drainage patterns and their significance, stream meandering and lateral erosion; interruptions and rejuvenation; shifting stream divides;	11

		misfit rivers; river terraces; causes of stream deposition- resulting landforms; topography on domal and folded structures.	
3	Glaciers	Definition of a glacier – types of glaciers – development of typical landforms by glacial erosion and deposition – cirque, U-shaped valley – hanging valley, monadnocks, moraines, drumlin. Eskers and Verves, Characteristic features of glaciated regions, Ice ages and past climates; geologic and paleontological evidence.	5
4	Groundwater	Storage of ground water – porosity, permeability, aquifer, water table, zone of saturation, artesian well, spring, geysers development of typical landforms by erosion and deposition by groundwater (Karst topography) - sinkhole, cavern, stalactites, and stalagmites.	4
5	Seas and Lake	Marine erosion, the shore profile, resulting topographic features; classification of coasts and shorelines; shoreline development, marine deposits, and coral reefs, Lacustrine (Lake) deposits	5
Total			40

4. Readings:

4.1. Textbook:

- Jain, S. (2014): Fundamentals of Physical Geology, Springer
- Summerfield, M. A. (1999): Global geomorphology- an introduction to the study of landforms, Longman
- Barkbank, D. W. and Anderson, R. S, (2008): Tectonic Geomorphology. Blackwell Science.
- Ford, D. and Williams, P. (2007): Karst Hydrology and Geomorphology. John Wiley & Sons

4.2. Reference Books:

- P Allison, R. J. (2002): Applied geomorphology, John Wiley & Sons. Inc.
- Turk, G. R. and Thompson, J. (1997) Introduction to Physical Geology (2nd Ed.), Brooks Cole.
- Holmes, A. (1978): Principles of Physical Geology (3rd Ed.), Wiley, 730p (3rd Ed)
- Cotton, C. A. (1952) Geomorphology, John Wiley & Sons Inc.

5. Outcome of the course:

At the end of this course, the student will be able to:

- Explain the Origin, Age and Interior of the Earth, Earthquakes, Isostasy, Continental Drift and Plate Tectonics.
- Discuss the geological structures formed by the Tectonic activities and the geological work done by a river and glacial processes.
- Describe the coastal process along the shoreline on the surface of the earth and the geological work done by the wind.