GEOMORPHOLOGY

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PRE-REQUISITES : Geology is compulsory, and Geography is preferable.

INTENDED AUDIENCE : Geosciences.

INDUSTRIES APPLICABLE TO : All companies dealing with infrastructure development and geological exploration.

COURSE OUTLINE :

Geomorphology deals with the activities of different natural surface and subsurface agents engaged in removal of old and formation of new landforms on the earth's surface. In modern days geomorphic evaluation of each and every area is utmost important for sustainable development. It helps in many fields such as groundwater exploration and storage, flood control, waste disposal, smart city development, oil and natural gas exploration, infrastructure development etc.

ABOUT INSTRUCTOR :

Prof. Pitambar Pati completed his Ph.D in 2008 from IIT Roorkee and working as a geologist in Geological Survey on India up to 2012. He has five years of industrial work experience in Geological Survey of India and more than six years of teaching experience as assistant professor of this institute since 2013. The instructor is working as Associate Professor in the Department of Earth Sciences in IIT Roorkee at present. The instructor was shortlisted among the outstanding teachers list of the institute in 2018 in PG level.

COURSE PLAN :

Week 1: Introduction to Geomorphology, timescale and processes of landform development, role of structure, time and processes, palimpsest nature of present major landforms, equilibrium and evolution, energy flow in geomorphic systems, role of uniformitarianism vs catastrophism in landscape development

Week 2: Weathering- mechanical, chemical and biological weathering, weathering of silicate minerals; soils- horizonation, factors affecting pedogenesis, use of

Week 3: Paloesols in climatic interpretation and dating of geomorphic surfaces and events, Mass wasting processes – classification and hillslope evolution

Week 4: Fluvial Geomorphology: Stream and river processes, processes of transport, channel geometry, concept of grade; depositional features- floodplain, fans, deltas, drainage patterns; morphometric analysis of drainage basins

Week 5: Desert Geomorphology- Deserts and global wind patterns, environments of wind action, erosion, transportation and depositional processes of wind. Use of desert geomorphology to study paleoclimate and paleogeography

Week 6: Glacial Geomorphology- Formation glacier ice from snow, morphological and thermal classification of glaciers, glacial landforms. Glaciation and isostasy. Quaternary glaciations and their significance

Week 7: Coastal geomorphology - Ocean waves, currents and tides, wave reflection and refraction, longshore and rip currents, littoral drift, typical landscapes, effects of base level changes on coastal and fluvial geomorphology: emergence, submergence progradation and erosion level

Week 8: Tectonic Geomorphology - Geomorphic indicators of tectonic activity and paleoseismicity- geomorphic indices, process -response models, use of geomorphic elements such as drainage patterns, terminal fans, fluvial and marine terraces, paleosols and alluvial fans in neotectonic interpretation. Geomorphic processes effect on Isostatic adjustment. Mountain front and foreland geomorphology

Week 9: Seismic Geomorphology: Seismic Geomorphology an over view, Seismic geomorphology in fluvial environment, in paleogeographic reconstruction, seismic geomorphology on sea bed.

Week 10: Exploration geomorphology: Geomorphology in mineral exploration, in ground water exploration, in hydrocarbon exploration

Week 11: Engineering geomorphology: Geomorphology in constructing engineering structures such as dam, tunnel, flood control structures and urban planning such as waste disposal sites, water storage sites

Week 12: Geomorphological mapping: Methods of preparation of geomorphological map, map elements in different environments. preparation of geomorphological map from satellite images. Study of geomorphic features from toposheets. Use of geomorphological map in developmental projects