B.Sc. III Year

Geology (GEO.302a)

Subject:Geology of economic mineral deposits, Stratigraphy and Geology of Nepal, Geophysics & Geochemistry

Nature of course: Practical Course No.: GEO 302a

Full marks: 30 Total period: 160

Pass marks: 12

Practical:

Geology of Economic Mineral Deposits

Lab 1: Preparation of mineral maps of Nepal**.**
Lab 2: Study of ores and industrial minerals in hand specimen.
Lab 3: Study of polish sections of important ores in reflected light.

Stratigraphy

Lab 1: Study of standard stratigraphic scale.
Lab 2: Study of index fossils of each major standard stratigraphic units (systems).
Lab 3: Study of standard magneto-stratigraphic scale.

Geology of Nepal

Lab 1: Study of geological map of Nepal.
Lab 2: Study of Precambrian, Palaeozoic, Mesozoic and Cainozoic stratigraphy of Nepal Himalaya.

Geochemistry and Geophysics

Lab 1: Statistical treatment of geochemical data (mean, mode, variance, kurtosis, standard deviation).
Lab 2: Resistivity methods (profiling and sounding) and interpretation.
Lab 3: Seismic refraction method and interpretation.

B.Sc. III Year

Geology (GEO.302b)

Subject : Field Work

Nature of course: Field Work Course No.: GEO 302b

Full marks: 20

Pass marks: 8

Course Load: 7 hours per day per teacher

Field Work Duration: 15 days

Providing techniques of locating observation points in a topographical map, measuring attitude of beds and plotting them in a topographical map, observing different rock types, primary and sedimentary structures found in the field area, preparing route map taking geological traverses. Preparing geological map, geological cross-section, and stratigraphical column of the investigated area.

Field work site: The geology department will select appropriate field work site to meet the above objectives.

Note: Each student shall compulsorily attend the field work and submit a report.

B.Sc. III Year

Geology (Geo 303 Elective)

Subject: Geomorphology

Nature of course: Theory Course No.: GEO.303 (Elective)

Full marks: 50 Total period: 75

Pass marks: 17.5

Main Topics	Contents	Period
Basic concept	Fundamental concepts of geomorphology, Degradation, aggradation, diastrophism, volcanism.	3
Processes and types of weathering	Processes of weathering, significance of weathering, rates of weathering, and processes of soil formation.	6
Igneous activity and landforms	Igneous activity in space and time, intrusive constructional forms, Extrusive constructional forms, igneous tectonism.	8
Structural landforms	Horizontal and domed structures, homoclinal structures, folded structures, faulted structures and joint structures.	8
Lithology and landforms	Arenaceous landforms, argillaceous landforms, calcareous landforms.	8
Mass movements	Significance, gravity, tectonics, classification, location of mass movement, causes of mass movement, mass movement and landform evolution.	8
Fluvial Geomorphology	River morphology, example of river metamorphosis, rivers and valley morphology, drainage basin evolution, *Fluvial depositional landforms*: Alluvial fans, valley fill, deltas.	8
Coastal and aeolian geomorphology	Shoreline processes and depositional forms, erosional coasts, sea-level variations, Organic coasts. Aeolian environments, Aeolian bedforms, coastal sand dunes, loess.	8
Glacial geomorphology	Glaciers, glacier flow, rock debris in glaciers, erosion by glaciers, deposition by glaciers, landforms of glacial deposition.	6
Climatic change and polygenetic landforms	Climatic change, the geomorphic effects of climatic change.	6
Applied geomorphology	Application of geomorphology to geo-hydrology, economic geology, engineering projects and other applied fields of geology.	6

Text and reference books:

Geomorphology

Chorley, R. J. et al. (1984): *Geomorphology*. Methuen and Co. Ltd., London, 605p.

Thornbury, D. W. (2000): *Principles of Geomorphology*, New Age International (P) Limited, Publishers, India. 594 p

Bloom, A. L. (1992): *Geomorphology,* Prentice Hall of India, 532 p

B.Sc. III Year

Geology (GEO.304 Elective)

Subject: Geohazards and Climate Change

Nature of course: Theory

Course No.: GEO.304 (Elective)

Full marks: 50

Total period: 75

Pass marks: 17.5

Main Topics	**Contents**	**Period**
Concept of hazard	Definition of hazard, types of geohazards, socio-economic impacts of geohazards.	2
Volcanic Hazards	Introduction, Volcanic hazard mapping.	2
Seismic hazards	Introduction, Earthquake vulnerability, Seismic hazard analysis: Seismic microzonation, Seismic risk assessment urbanization and seismic risk, Earthquake risk in the Himalayan region.	6
Landslide Hazards	Introduction to Landslide, Landslide hazard mapping.	6
Land subsidence	Types and causes of land subsidence, subsidence hazard mapping. Land subsidence problems in Nepal.	6
Flood hazards	Introduction, Types of floods, Flood hazard mapping, Flood hazard in Nepal, Glacial Lake Outburst Flood (GLOF), The GLOF hazard, Landslide Dam Outburst Flood (LDOF).	6

Risk reduction and mitigation methods	Vulnerability and risk assessment of geohazards, risk reduction and mitigation measures.	6
Policies and conventions	Policy in response to geohazards: lessons from developed and developing countries, Nature of responses to geohazards, Emergency responses, Planning for losses, Controlling the effects, Improving the understanding of hazard, The UN International Decade for Natural Disaster Reduction (IDNDR) and International Strategy for Disaster Reduction (ISDR), National Disaster Policy of Nepal	6
The Science of Climate Change	Climate, climate types and climate change, Observed changes in climate, Causes of climate changes, Climate parameter changes, Predicting future climates, Special features of climate changes in the Himalaya- Tibetan region.	6
Recent climate change and its effects	Changes in air and sea surface temperature, Effects in Glaciers, Sea ice and Ice sheet, sea level, Effect of galactic variations. Evidences and misconception of climate change.	6
Conceptual and numerical climate model	The source of energy for our climate system, Energy loss and radiation system, The greenhouse effect, The carboncycle: Atmosphere–land-biosphere–ocean carbon exchange, Atmosphere–rock exchange, humans perturbing the carbon cycle, Climate sensitivity	6
The future of theearth's climate	The factors that control emissions, Population change and affluence effects, Emissionsscenarios, Volcanic eruptions, Projections of future climate.	6
Impacts of climate change	Impacts on health, food, water resources, vegetation, natural disaster, poverty and social security.	6
International climate change conventions, protocols and national perspectives	UNFCC, Kyoto protocol, Bali Action Plan, Copenhagen Accord, Climate Change policies and related laws of Nepal.	6

Reference books:

1. McCall G.J.H., Laming D.J.C., Scott S.C., 1992, Geohazards, natural and man-made, Chapman & Hall, 2-6 Boundary Row, London SEI SHN, 226p.
2. Waltham Tony, Bell Fred, Culshaw Martin, 2005, Sinkholes and Subsidence (Karst and cavernous Rocks in Engineering and Construction), Praxis Publishing Ltd, Chichester, UK, 382p.
3. Dahal, Ranjan Kumar, 2006, Geology for Technical Students, Bhrikuti Academic Publications, Exhibition Road, Kathmandu, Nepal, 756p.
4. Zeitoun David G., WakshalEliyahu,2013, Land subsidence analysis in urban areas, Springer Science and Business Media, Dordrecht, 307p.
5. Dessler, Andrew Emory, 2011, Introduction to modern climate change, Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473, USA, 238p.
6. Malik, Ashok, 2008, Causes of climate change, Rajat Publications New Delhi -110 002 (India), 296p.
7. Pelling, Mark, 2011, Adaptation to Climate Change: from resilience to transformation, Routledge, 2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN. 274p.
8. Letcher, Trevor M.(editor), 2009, Climate Change: Observed Impacts on Planet Earth, Elsevier Radarweg 29, PO Box 211, 1000 AE Amsterdam, The Netherlands, 494p.
9. Dragoni W. and Sukhija B. S., 2008, Climate Change and Groundwater, Geological Society Special Publication No. 288, The Geological Society London, 186p.
10. Henry j. Vaux (Chair), 2007, Himalayan Glaciers: Climate Change, Water Resources, and Water Security, The National Academies Press, Committee on Himalayan Glaciers, Hydrology, Climate Change, and Implications for Water Security Board on Atmospheric Studies and Climate, 206p.