University of Engineering and Technology, Taxila

Department of Civil Engineering

Course Title: Engineering Geology (CE-103)

Pre-requisite(s): None

Credit Hours: 2 + 1

Contact Hours: 2 + 3

Text Book(s): **1.** A Geology for Engineers, *by* F.G.H. Blyth and M.H. De Freitas, 7th Edition

Reference Book(s): **1.** Principles of Physical, Geology, *by* Arthur Holmes, 4th revised edition

2. Geology for Civil Engineers, *by* Marcus Matthew and Noel Simon, 2nd Edition

Catalog Data:

Introduction; Rocks & Minerals, Structural Features; Weathering and Erosion, Volcanoes; Landslides; Earthquakes; Tunneling; Geological Survey Maps; Engineering Applications.

Course Objectives:

- To understand composition of various minerals, rock and their properties.
- To develop a skills for application of geology to engineering problems.

Course Learning Outcomes:

At the end of this course, the student will:

CLO:1 Understand the basic concept of geology

CLO:2 Understand the formation of rocks and structural features of strata

CLO:3 Have knowledge about landscape, earthquakes and tunneling

CLO:4 Apply acquired knowledge in civil engineering projects

CLO:5 Have skills to understand geological survey maps

Course Contents:

Introduction

- Introduction to various branches of geology
- Origin and internal constitution of the earth.

Rocks and Minerals, Structural Features

- Main groups
- Igneous, sedimentary and metamorphic rocks
- Important minerals and ores
- Rock cycle.
- Glaciers and glaciations
- Dip, strike, folds, faults, joints, unconformities conformable and un conformable series of strata
- Effects of folding.
- Faulting and jointing on civil engineering projects and their recognition in the field

Weathering and Erosion, Volcanoes

- Agents of weathering and erosion
- Weathering classification
- Cycle of erosion, normal, glacial and marine erosion
- Land forms
- Mass wasting
- Formation of meanders and ox-bow lakes
- Formation of volcanoes
- Causes of volcanoes
- Nature and types of volcanic eruptions
- Products of eruptions
- Types of volcanoes
- Geysers

Landslides

- Definition, causes of landslides
- Classification of landslides
- Preventive measures against landslides

Earthquakes

- Definition and related technical terms
- Causes of earthquake
- Classification of earthquakes
- Earthquake or seismic waves
- Mechanism of earthquake
- Measuring of earthquake intensity (modified mercali intensity scale)
- Effects of earthquake and protective measures against earthquake

Tunneling

- Engineering geology of tunnels
- Geological survey prior to tunnel

- Lining of tunnels and their section
- Selection of tunnel site and its requirements.

Geological Survey Maps

- Physical method of subsurface mapping
- Exploratory geological surveys at engineering sites

Engineering Applications

- Importance of geology for civil engineering projects,
- Important building stones and other construction materials.
- Geology of aquifers, wells, springs, streams and ground water conditions, hydrologic cycle.
- Role of geology in selection of sites for dams, reservoirs and pertinent geological investigations.
- Geology of foundations, cutting tunnels, highways, airfields and bridges.

Grading Policy:

Sr. No.	Grading	% of Total Marks
1	Assignments	10
2	Quizzes	10
3	Practical	20
4	Midterm Exam	20
5	Final Exam	40
	Total	**100**

Student Learning Outcomes:

Students who pass the course will gain the knowledge about formation of rocks, structural features of strata, occurrence of earthquakes/landslides and geological survey maps.

Course Professional Outcome/Industrial Usage:

Students learn basic ideas and concept of structural features of strata, occurrence of earthquakes/landslides and geological survey maps. Furthermore, they would be able to give input in geotechnical engineering.

PLOs	CLOs				
	CLO-1 (Basic Concept of Geology)	**CLO-2** (Structural Features of Stratas)	**CLO-3** (Study of earthquakes, landscape, Tunneling)	**CLO-4** (Application)	**CLO-5** (Skills for Geological Survey Maps)
PLO 1 (Engineering Knowledge)	✓	✓			
PLO 2 (Problem Analysis)			✓		
PLO 3 (Design/Development of Solutions)					
PLO 4 (Investigation)			✓	✓	✓
PLO 5 (Modern Tool Usage)					
PLO 6 (The Engineer and Society)					
PLO 7 (Environment and Sustainability)					
PLO 8 (Ethics)					
PLO 9 (Individual and Team work)					
PLO 10 (Communication)					
PLO 11 (Project Management)					
PLO 12 (Lifelong Learning)					

Assessment Modules	**CLOs**				
	CLO 1	**CLO 2**	**CLO 3**	**CLO 4**	**CLO 5**
Assignments			✓	✓	✓
Quizzes	✓	✓	✓		
Midterm Exam	✓	✓	✓		
Final Exam	✓	✓	✓	✓	✓