



Course Specification

Diploma

Course Title: **Structural Geology**

Course Code: **APMQ1205**

Program: **Mining and Quarrying**

Department: **Diploma Department**

College: **The Applied College**

Institution: **Umm Al-Qura University**

Version: **1**

Last Revision Date: **20 February 2025**



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A. General information about the course:

1. Course Identification

1. Credit hours: (2)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others
B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (1 St. Level)

4. Course General Description:

1. Course Description

Introduction: Composition of the Earth - Isostasy of the Earth- Forces in the Earth's crust- Different types of structures. Stress: Definition - Types- Uni-axial stress- Plane stress- Stress in 3D - Mohr circle uses in stress analysis - Mohr envelope - Factors controlling the brittle failure of the rocks. Strain: Definition – Types - Strain in 2D - Strain in 3D - Mohr circle uses in the strain analysis - Strain markers analysis. Structural elements, classification, methods of representation. Joints, classification, kinematics of jointing. Faults, definition, classification, kinematics of faulting, criteria of faults recognition, fault mechanics solution. Folds: Definitions - Classifications, Fold mechanisms - Criteria of fold recognitions, superimposed folding. Types of discontinuities and Unconformities. Shear zones and shear sense indicators. Analysis of structural data with geological maps as practical.

5. Pre-requirements for this course (if any):

None

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

1. Overview of Structural Geology:

Introduction to Structural Geology covering its elements, including folds, faults, joints, and unconformities.

2. Understanding Outcrop and Orientation:

Basics of outcrops, definitions of strike (direction) and dip (slope) relevant in geological mapping.



3. Fold nature and Behavior:

Folds in geology, describing their formation through compressive forces and various classifications.

4. Classification of Folds:

Detailed categorization of folds into anticline, syncline, symmetrical, asymmetrical, plunging, non-plunging, open, closed, and other unique types.

5. Folding Mechanisms and Effects:

The mechanisms behind folding shapes and the geological influences, including topographic effects of erosion on folds.

6. Introduction to Faults:

Discussion on faults such as geological structures, types, impacts on construction, and deviation along fault planes. Comparison of joints and faults in geological terms, emphasizing displacement in faults and characteristics of joints.

7. Fault Characteristics and Types:

Classification of faults based on displacement, movement types, and specific structures like horsts and grabens.

8. Causes and Effects of Faulting:

Explains the causes of faults, particularly tectonic forces, and the geological consequences of faulting.

9. Joints in Geological Structures:

Definition and effects of joints in rocks, including their impact on engineering stability and groundwater potential.

10. Classification of Joints:

Types and classifications of joints based on orientation, attitude, and the forces that create them.

11. Unconformities in Geology:

Description of unconformities, their significance, types (non-conformity, angular, disconformities), and recognition methods.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning		



3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

1.0	Knowledge and understanding			
1.1	Overview of the principles of structural geology in the exploration and mining fields.	K1	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
1.3	Understand structural elements, concept of strain and stress, deformation mechanism of rocks, Foliation and lineation, folds and mechanisms, fractures, joints and faults, structural mapping.	K2	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
2.0	Skills			
2.1	Improved confidence in recognizing and interpreting key structures in the field and in exploration.	S1	Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes
2.2	Improved confidence and efficiency in structural data analysis and interpretation.	S3	Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes
3.2	Reduction of the inherent risk associated with exploration and mining.	S4	Interactive Discussions	Written Exams (Mid-Term and Final Exams),
3.0	Values, autonomy, and responsibility			
3.1	Work cooperatively in a small group environment	V1	Individual and Group Presentations	Presentations

C. Course Content

No	List of Topics	Contact Hours
1.	Overview of Structural Geology	2
2.	Understanding Outcrop and Orientation	2
3.	Fold nature and Behavior	2
4.	Classification of Folds	2
5.	Folding Mechanisms and Effects	2
6.	Introduction to Faults	2
7.	Fault Characteristics and Types	2
8.	Causes and Effects of Faulting	2
9.	Joints in Geological Structures	2
10.	Classification of Joints	2
11.	Unconformities in Geology	2
12.	Introduction: Composition of the Earth - Isostasy of the Earth- Forces in the Earth's crust	2
13.	Strain: Definition – Types - Strain in 2D - Strain in 3D - Mohr circle uses in the strain analysis	2
14.	Shear zones and shear sense indicators.	2
15.	Analysis of structural data with geological maps as practical.	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	5	10
2.	Mid-Term Exam	8	20
3.	Presentations	12	10
4.	Homework	All weeks	10
5.	Final Exam	16	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources





Essential References	<ul style="list-style-type: none"> • Structural geology: fundamentals and modern developments, Ghosh, Santi Kumar, Oxford; New York, 1993. • Structural Geology (2nd edition): by Haakon Fossen; Cambridge University, 2016. • Structural Geology: R. J. Twiss and E. M. Moores. W. H. Freeman & Co., San Francisco, 1992.
Supportive References	
Electronic Materials	Teaching Earth Science: https://geology.com/teacher/ Authoritative source (free) of a Collection of Classroom Activities and Lesson Plans, have a list of resources that can easily be modified and incorporated into the classroom.
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty	Direct (project, HW, Quiz, midterm and final exam)
Effectiveness of Students assessment	Students	Indirect (Student Survey)
Quality of learning resources	Program Coordinator	Direct analysis
The extent to which CLOs have been achieved	Program Coordinator	Direct analysis
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)





G. Specification Approval

COUNCIL /COMMITTEE	Umm Al-Qura University Council
REFERENCE NO.	851110214476/195605
DATE	18/2/1447

