



Course Specification

Diploma

Course Title: **Geology of Mineral Deposits**

Course Code: **APMQ2208**

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: (2)
(2nd. Level)

4. Course General Description:

1. Course Description

Overview of the classification of mineral deposits; detailed characterization of different types of ore deposits and mineral commodities. Quality criteria, chemical properties, production and exploration possibilities of ore deposits. Knowledge of the most important features of the geological setting of ore deposits and the quality criteria, chemical characteristics and exploration. Introduction to uses and applications of ore deposits.

The Geology of Mineral Deposits is a branch of geology focused on the origin, distribution, classification, and exploration of economically valuable minerals. It combines knowledge of geological processes—like magmatism, sedimentation, metamorphism, and hydrothermal activity—to understand how ore bodies form and where they can be found.

Students and professionals in this field study the types of mineral deposits, their host rocks, mineralogy, alteration zones, and the tectonic settings in which they occur. The course also emphasizes methods of exploration, such as geophysical surveys and geochemical analysis, and covers the economic significance of various minerals.

Understanding the geology of mineral deposits is crucial for mineral exploration, mining, and resource management, as well as for assessing the environmental impacts of mining activities.

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

General Geology

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

None

7. Course Main Objective(s):

1. Understand the Formation of Mineral Deposits

Learn the geological processes (magmatic, hydrothermal, sedimentary, metamorphic) responsible for the formation of mineral resources.



Understand the role of plate tectonics, magmatism, and fluid flow in ore genesis.

2. Classify Different Types of Mineral Deposits

Study and classify ore deposits based on genesis (e.g. hydrothermal, magmatic, volcanogenic).

Learn common models like porphyry copper, skarn, epithermal, VMS, SEDEX, etc.

3. Learn Methods of Exploration and Identification

Understand how geological, geochemical, and geophysical techniques are used to locate and evaluate mineral deposits.

Use maps, cross-sections, and data to identify prospective areas.

4. Analyze Mineralogical and Geochemical Characteristics

Identify ore and gangue minerals.

Understand alteration patterns and geochemical signatures of deposits.

5. Study Economic and Strategic Importance

Learn which deposits are economically viable and why.

Understand market demand, critical minerals, and global distribution of resources.

6. Develop Skills in Ore Deposit Interpretation

Interpret deposit genesis and history using core samples, field evidence, and data.

Build conceptual models of ore-forming systems.

7. Apply Knowledge to Mining and Resource Assessment

Use geological knowledge to support mining activities and resource estimation.

Understand the environmental and sustainability aspects of mineral extraction.

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		30

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

1.0	Knowledge and understanding			
1.1	1. Understand the Formation of Mineral Deposits Learn the geological processes (magmatic, hydrothermal, sedimentary, metamorphic) responsible for the formation of mineral resources.	K1	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
1.2	Learn Methods of Exploration and Identification Understand how geological, geochemical, and geophysical techniques are used to locate and evaluate mineral deposits.	K2	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
1.3	Study Economic and Strategic Importance Learn which deposits are economically viable and why. Understand market demand, critical minerals, and global distribution of resources.	K4	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
2.0	Skills			
2.1	Classify Different Types of Mineral Deposits Study and classify ore deposits based on genesis (e.g. hydrothermal, magmatic, volcanogenic). Learn common models like porphyry copper, skarn, epithermal, VMS, SEDEX, etc.	S1	Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes
2.2	Analyze Mineralogical and Geochemical Characteristics		Interactive Discussions	Written Exams (Mid-Term and





	Identify ore and gangue minerals. Understand alteration patterns and geochemical signatures of deposits.	S2		Final Exams), Quizzes
3.2	Develop Skills in Ore Deposit Interpretation Interpret deposit genesis and history using core samples, field evidence, and data.	S3	Interactive Discussions	Written Exams (Mid-Term and Final Exams),
3.0	Values, autonomy, and responsibility			
3.1	Apply Knowledge to Mining and Resource Assessment Use geological knowledge to support mining activities and resource estimation. Understand the environmental and sustainability aspects of mineral extraction.	V1	Individual and Group Presentations	Presentations

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Economic Geology & Mineral Resources	2
2.	Principles of Ore Formation & Classification	2
3.	Magmatic Ore Deposits (e.g. chromite, Ni-Cu, PGE)	2
4.	Hydrothermal Systems and Vein Deposits	2
5.	Porphyry and Epithermal Systems	2
6.	Skarn Deposits and Contact Metasomatism	2
7.	Volcanogenic Massive Sulfide (VMS) and SEDEX	2
8.	Sedimentary Ore Deposits (e.g. BIF, placer, uranium)	2
9.		2
10.	Supergene Enrichment and Weathering Processes	2
11.	Metamorphic and Metasomatic Deposits	2
12.	Tectonic Settings and Ore Genesis	2
13.	Mineral Exploration Techniques	2
14.		2





	Economic Evaluation and Resource Estimation	
15.	Environmental Considerations in Mining	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	<ol style="list-style-type: none"> 1. Robb, L. (2005) – <i>Introduction to Ore-Forming Processes</i> A widely used, clear and modern overview of ore-forming systems and processes. 2. Guilbert, J.M. & Park, C.F. (1986) – <i>The Geology of Ore Deposits</i> Classic and comprehensive; focuses on deposit types and their characteristics. 3. Evans, A.M. (1993) – <i>Ore Geology and Industrial Minerals</i> Covers both metallic ores and industrial minerals; well-illustrated and accessible.
Supportive References	<ul style="list-style-type: none"> • Kirkham, R.V., Sinclair, W.D., Thorpe, R.I. & Duke, J.M. (1995) – <i>Mineral Deposit Models</i> A GSC publication covering major deposit types with diagrams and exploration models. • Hedenquist, J.W., Thompson, J.F.H., Goldfarb, R.J. & Richards, J.P. (2005) – <i>Economic Geology 100th Anniversary Volume</i>





	Collection of major review papers on ore-forming systems. Dense but gold-standard.
Electronic Materials	
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

