



Faculty of Earth Sciences



Department of Mineral Resources & Rocks 3rd & 4th Years Program



The Geological Society
Accredited degree courses

ADVANCED METAMORPHIC PETROLOGY

Course Name	Course ID	Prerequisite
ADVANCED METAMORPHIC PETROLOGY	EMR 422	EMR 304

Time Table for Course Lectures

ADVANCED METAMORPHIC PETROLOGY (EMR 422)

Week	Main Topics
	Objectives and Attendance
1	Grades and Exams References, Websites, and Internet How to be Successful in this Course Student's Responsibility
2	Textures of Metamorphic Rocks ^[1] Examples of Metamorphic Textures Metamorphic Facies and Zones
3	Index Minerals ^[2,3] Metamorphic Isograds and Metamorphic Zones – Types of Metamorphic Zones. Relationship Between Metamorphic Facies and Zones
4	Metamorphic Reactions ^[4,5] Prograde Reactions and Retrograde Reactions Equilibrium and Disequilibrium : Types of Metamorphic Reactions § Univariant Reactions § Divariant Reactions § Dehydration Reactions § Decarbonation Reactions § Unmixing Reactions

5	Metamorphic Models ^[6] § Normal or Clockwise Model § Reverse or Counterclockwise Model § Phase Rule § Applied Example for the Phase Rule
6	Periodical Exam
7	Principal Types of Phase Diagrams ^[7,8] § ACF - AKF - AFM - CMS Diagrams § How to Represent the Chemical Data of Metamorphic Rock on ACF and AFM Diagram
8	Metamorphism of Calcareous Rocks ^[9,10] § Metamorphism of Limestone § Progressive Metamorphic Reactions In Siliceous Dolomitic Limestones (CMSCH) § Index Mineral in CMSCH § Examples for Metamorphism of Calcareous Rocks
9	Metamorphism of Ultramafic Rocks ^[11,12] § CMS-CH System § Index Mineral in CMS-CH System § P-T Diagram and T-X _{CO2} Diagram
10	Metamorphism of Pelitic Rocks ^[13] Metamorphism in the KFMASH System Metamorphism of Mafic Rocks ^[14] § High P / High T Metamorphism § High P / Low T Metamorphism § High T / Low P Metamorphism
11	Periodical Exam
12	Metamorphism and Plate Tectonic ^[15] § Burial Metamorphism § Subduction Zone Metamorphism § Regional Metamorphism § Zone of Contact Metamorphism
14	Introduction to Thermodynamics ^[16,17] § Enthalpy – Entropy – System § Geothermobarometry § Exchange Reactions § Solvus Reactions § Net Transfer Reactions (Solid-Solid Reactions) § Precautions for Application of Geothermobarometry § Examples for Geothermometers and Geobarometers

References:

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter [1] 3, Arabic reference).

Petrogenesis of Metamorphic Rocks, by Kurt Bucher and Martin Frey, 1994 (Chapter 4). [2]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter [3]

4, Arabic reference).
Petrogenesis of Metamorphic Rocks, by Kurt Bucher and Martin Frey, 1994. (Chapter 3) [4]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 5, Arabic reference) [5]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 5 Arabic reference) [6]

Petrogenesis of Metamorphic Rocks, by Kurt Bucher and Martin Frey, 1994 (Chapter 2) [7]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 6 Arabic reference) [8]

Petrogenesis of Metamorphic Rocks, by Kurt Bucher and Martin Frey, 1994. (Chapter 6) [9]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 7 Arabic reference) [10]

Petrogenesis of Metamorphic Rocks, by Kurt Bucher and Martin Frey, 1994 (Chapter 5) [11]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 9 Arabic reference) [12]

Petrogenesis of Metamorphic Rocks, by Kurt Bucher and Martin Frey, 1994 (Chapter 5) [13]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 8 Arabic reference) [14]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 11 Arabic reference) [15]

Petrogenesis of Metamorphic Rocks, by Kurt Bucher and Martin Frey, 1994 (Chapter 3) [16]

Introduction to Metamorphic Rocks, by Alfilali, I.Y., 2005 (Chapter 10 Arabic reference) [17]

ADVANCED METAMORPHIC PETROLOGY (EMR 422)

Time Table for Practical Course

Lab. #	Title
1	General features of the Lab course Study of the rock forming minerals Optical properties of metamorphic minerals
2	A revision of all the metamorphic minerals under the microscope
3	Study of Metamorphic textures and their significance in studying the metamorphic evolution of rocks
4	
5	Exam
6	Study of different rocks from contact metamorphism, their mineral assemblage, their textures and their grade of metamorphism
7	
8	Study of different rocks from regional metamorphism, their mineral assemblage, their textures and their grade of metamorphism
9	
10	Study of very high grade rocks such as granulite, eclogite and blue schist facies, their mineral assemblage, their textures and their grade of metamorphism
11	
12	Graphical representation of metamorphic minerals and rocks
13	Revision
14	Final Exam

References:

- [1] *Introduction to Metamorphic Rocks*, by Alfilali, I.Y. 2005. Anglo-Egypt Lib. Pub. Cairo (in Arabic)
- [2] *Petrogenesis of Metamorphic Rocks*, by Bucher, K., and Frey, M., 1994. Blackie, Glasgow, London.