



Faculty of Earth Sciences



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



The Geological Society
Accredited degree courses

OPTICAL MINERALOGY

Course Name	Course ID	Prerequisites
Optical Mineralogy	EMR 211	EMR 202

Time Table for Course Lectures

OPTICAL MINERALOGY (EMR 211)

Week	Topic
1	Introduction to the Course Definition of optical mineralogy – Nature of Light (Theories of light, Wave Nomenclature, Electromagnetic Radiation, Wave Front, Wave Normal, Phase and Interference)
2	Polarizing Microscope - General features, Optical system, Parts of microscope - Illumination system, Accessory plates, Centering the microscope, Care of the microscope
3	Reflection and Refraction The index of refraction, Snell's Law, Critical Angle and Total Reflection, Polarization of Light
4	Optical Properties of Minerals Using Polarized Light: (Color, Form and Habit, Cleavage, pleochroism – refractive index – relief – twinkling)
5	Uniaxial and Biaxial Indicatrix
6	Optical Properties of Minerals Using Crossed Nicols (Isotropic and anisotropic minerals, Interference colors, Extinction – Elongation sign – Twinning – Zoning)
	Exam
7	Optical Properties Of Minerals Using Convergent Polarized Light (means of obtaining convergent polarized light – formation of Interference figures) Uniaxial Interference Figures (types – estimation of birefringence – optic sign determination)

8	Biaxial Interference Figures (types – estimation of birefringence – optic sign determination) The difference between uniaxial and Biaxial interference figures – The importance of interference figures
9	Midterm Exam
	Optical Properties Of The Rock Forming Minerals ^[3] - Classification of minerals according to their importance in the formation of rocks (essential silicates, accessory silicates, metamorphic silicates, and nonsilicates) 1 - Silica Group (quartz – chalcedony)
10	2 - Alkali feldspars ^[4] (orthoclase – microcline – sanidine) 3 - Plagioclase feldspars (the characteristic optical properties of this group of minerals – methods of differentiation between the minerals according to the An contents.
11	4- Mica Group (biotite – muscovite – chlorite) 5- Amphibole Group (actinolite – tremolite – hornblende – riebeckite)
12	6- Pyroxene and olivine Groups (Enstatite – Hypersthene – Augite – Diopside – Aegirine – Olivine) 7- Metamorphic silicates (andalusite – kyanite – garnet)
13	8- Accessory Silicates (Zircon – Apatite – Tourmaline – Sphene) 9- Non-silicate minerals - Carbonates (calcite – dolomite)
14	Halides (fluorite – halite) Sulphate (gypsum – anhydrite) General Revision
15	Final Examination

References:

- [1] *Introduction to Optical Mineralogy*, by Nesse, W.D., 2004. Oxford Univ. Press.
[2] *Minerals Under Microscope (In Arabic)*, by Bashady, A.M. and Hassan, M.A., 1993. Dar Al Falah, Kuwait.

PRINCIPLES OF OPTICAL MINERALOGY (EMR 211)

Time Table for Practical Course

Week	Topic
1	Parts of the Microscope (Focusing- adjusting the oculars, centering the objectives, Adjusting the substage, Alignment of the Polaris, General Care of the Microscope)
2	Optical properties of minerals in ordinary light (Color, Shape and Habit, Cleavage, Inclusions, Alteration)
3	Optical properties of minerals in polarized light (Pleochroism, Refractive index)
4	Optical properties of minerals in polarized light (Relief, Twinkling)
5	Optical properties of minerals under Crossed Nicols (Isotropic and anisotropic minerals, Extinction and extinction angle, Interference colors)
6	Optical properties of minerals under Crossed Nicols (Twinning, uniaxial and biaxial minerals, sign of elongation)

7	Interference figures in Uniaxial and Biaxial Minerals, Optic Orientation of Uniaxial and Biaxial Minerals
8	Midterm Exam
9	Microscopic Study of Some Common Rock-forming minerals Felsic minerals (Quartz, Plagioclase, k-feldspars)
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11	Microscopic Study of Some Common Rock-forming minerals Mafic Minerals (, pyroxenes, amphiboles),
12	Microscopic Study of Some Common Rock-forming minerals Mafic Minerals (Micas, chlorite, olivines),).
13	Accessory Minerals (sphene, zircon, Apatite, garnet, calcite,) - Miscellaneous minerals (e.g., gypsum, dolomite, fluorite, halite
14	General Revision
15	Practical Final Exam

References:

Optical Mineralogy, by Kerr, P.F., 1977. McGraw Hill. [1]

Atlas of the Textural Pattern of Granites, Gneisses and Associated Rock [2]

Types, by Augustithis, S.S., 1973. Elsevier Sci.