ENVG 242 - Mineralogy and Optical Mineralogy

Instructor: Dr. Peter C. Burns
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Class: Monday and Friday 9:35 Nieuwland 182

Lab: Thursday 2:00 Fitzpatrick 161

TA: Tori Ziemann

Required Textbooks:

Manual of Mineral Science, 22st Edition, Cornelis Klein

Introduction to Optical Mineralogy, 3nd Edition, Willian D. Nesse

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Evaluation Procedure:

Lecture:	Midterm Examination, October 11	20%
	Final Examination	40%
Laboratory:	Assignments	10%
	Lab Tests & Quizzes	10%
	Lab Final Examination	20%

Notes:

(1) Attendance to all lectures and labs is mandatory.

(2) Lab rules must be followed at all times when working in room Fitzpatrick 161.

ENVG 242 - Mineralogy and Optical Mineralogy: Lecture Titles

Lecture Schedule: M, F 9:35 – 10:25 a.m., NIEU 182

- Introduction, History of Mineralogy
- Properties of Minerals
- Mineral Classification
- Symmetry and Crystallography: Operators
- Symmetry and Crystallography: Point Groups
- Symmetry and Crystallography: Directions in Crystals
- Symmetry and Crystallography: Space Groups
- Crystal Chemistry
- Metals, Sulphides
- Oxides, Hydroxides, Halides
- Light, Microscopes
- Relief, Plane-Polarized Light, Thin Sections
- Interference of Light, Cross-Polarized Light, Extinction
- The Optical Indicatrix
- Conoscopic Illumination, Uniaxial Figures
- Carbonates, Phosphates
- Conoscopic Illumination, Uniaxial Figures
- Biaxial Indicatrix, Biaxial Figures
- Quartz, Feldspars
- Feldspars, Feldspathoids, Zeolites
- Phyllosilicates
- Inosilicates
- Cyclosilicates, Sorosilicates, Nesosilicates

ENVG 242 - Mineralogy and Optical Mineralogy: Lab Titles

Lab Schedule: Room 161 Fitzpatrick

Required Equipment: pencil, ruler, protractor, needle, nail, penny, hand lens, magnet

Specimens: The mineral specimens relevant to this course are contained in labeled drawers in Fitzpatrick 161.

1. Symmetry and Crystallography I
2. Introduction to Mineral Properties, Mineral Chemistry
3. Metals, Sulphides, Oxides, Hydroxides, Halides
4. Symmetry and Crystallography II
5. **MINERAL QUIZ**, Introduction to the Microscope, Refractive Indices, Becke Line
6. Plane-Polarized Light, Thin Sections, Cross-Polarized Light, Features in Thin Section
7. Carbonates, Phosphates, Borates
8. Conoscopic Illumination, Uniaxial Figures
9. Conoscopic Illumination, Biaxial Figures
10. Quartz, Feldspars, Feldspathoids, Zeolites, Phyllosilicates
11. **MINERAL QUIZ** Inosilicates, Cyclosilicates, Sorosilicates, Nesosilicates
12. **EXAM**

ENVG 242 - Mineralogy and Optical Mineralogy

Students are required to be able to recognize the following minerals in hand specimen

Students must know the chemical formula for each mineral

Elements

- Copper
- Iron
- Sulphur
- Graphite

Oxides

- Corundum
- Hematite
- Illmenite
- Rutile
- Pyrolusite
- Cassiterite
- Spinel
- Magnetite
- Chromite

Hydroxides

- Brucite
- Manganite
- Goethite
- Bauxite

Carbonates

- Calcite
- Magnesite
- Siderite
- Rhodocrosite
- Dolomite
- Aragonite
- Malachite
- Azurite

Halides

- Halite
- Fluorite

Borates

- Colemanite
- Kernite

Sulfates

- Barite
- Celestite
- Anhydrite
- Anglesite
- Gypsum

Phosphates

- Apatite
- Monazite

Sulfides

- Chalcocite
- Bornite
- Galena
- Sphalerite
- Chalcopyrite
- Pyrrhotite
- Covellite
- Cinnabar
- Realgar
- Stibnite
- Pyrite
- Marcasite
- Arsenopyrite
- Molybdenite

Sylvite

Silicates

Tectosilicates
- Quartz
- Opal
- Alkali Feldspars
  - *Sanadine*
  - *Orthoclase*
  - *Microcline*
- Plagioclase Feldspars
  - *Albite*
  - *Oligioclase*
  - *Andesine*
  - *Labradorite*
  - *Bytownite*
  - *Anorthite*
- Leucite
- Nepheline
- Sodalite
- Chabazite

Phyllosilicates
- Serpentine
- Kaolinite
- Talc
- Muscovite
- Biotite
- Chlorite

Nesosilicates
- Olive
  - *Forsterite*
  - *Fayalite*
- Garnet
  - *Pyrope*
  - *Almandine*
  - *Spessartine*
  - *Grossular*
  - *Andradite*
- Zircon
- Andalusite
- Sillimanite
- Kyanite

Inosilicates
- Amphiboles
  - *Anthophyllite*
  - *Cummingtonite*
  - *Grunerite*
  - *Tremolite*
  - *Actinolite*
  - *Hornblende*
  - *Glaucophane*
  - *Riebeckite*
- Pyroxenes
  - *Enstatite*
  - *Hypersthene*
  - *Pigeonite*
- *Diopside*
  - *Hedenbergite*
  - *Augite*
  - *Jadeite*
  - *Aegirine*
  - *Spodumene*

Cyclosilicates
- Beryl
- Tourmaline

Sorosilicates
- Epidote
- Vesuvianite

Topaz
Staurolite