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### ERSC 2P22 - Optical Mineralogy

#### Course Description:

- Properties of light and its interaction with mineral grains:
  - reflection, refraction, polarization, interference phenomena, extinction, colour and pleochroism.
- Refractometry; isotropic, uniaxial and biaxial optics; interpretation of interference figures.
- Transmitted light petrography in the identification and familiarization with major rock forming minerals in grain mounts and thin section.

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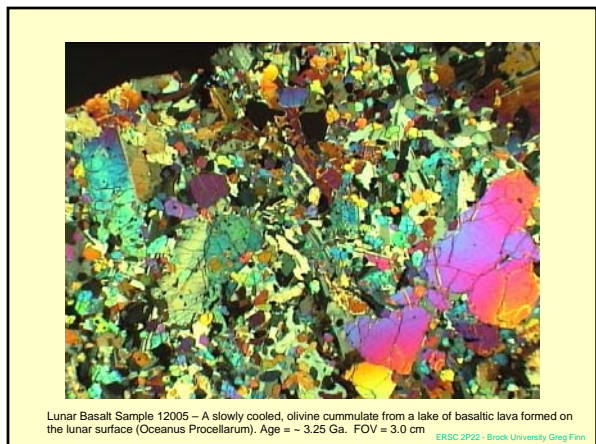
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Lunar Basalt Sample 12005 - A slowly cooled, olivine cumulate from a lake of basaltic lava formed on the lunar surface (Oceanus Procellarum). Age = ~ 3.25 Ga. FOV = 3.0 cm ERSC 2P22 - Brock University Greg Finn

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### Course Objectives

1. Familiarization with the properties of light and how it interacts with a mineral
2. Use of the petrographic (polarizing) microscope
3. Recognition of:
  - Garnet, halite, fluorite, periclase
  - Quartz, apatite, nepheline, calcite, tourmaline, zircon
  - Olivine, orthopyroxene, clinopyroxene, amphibole, biotite, muscovite, chlorite, plagioclase feldspar, alkali feldspar
4. **Ability to identify an unknown mineral based on determining its optical properties**

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### 2P22 - Introduction

- Greg Finn
  - 13<sup>th</sup> Floor, Schmon Tower
  - [Greg.Finn@brocku.ca](mailto:Greg.Finn@brocku.ca)
  - **SEND ME AN E-MAIL FROM THE MAILBOX ADDRESS YOU REGULARLY USE**
- Lectures
  - Monday, Wednesday and Friday
  - 9:00 - 10:00 a.m. in D308
- Laboratory
  - Monday
  - 2:00-5:00 in D308

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### 2P22 - WEBSITE

- This course has a home page on the World Wide Web, the URL is:  
<http://www.brocku.ca/earthsciences/people/gfinn/optical/2P22.htm>.
- This page contains links to course lecture material as well as copies of overheads used in the lectures. Please let me know if there are problems with these pages
- **PDF files of Lecture PowerPoint slides are available here for downloading.**

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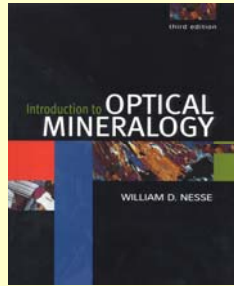
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### 2P22 - TEXT

- **Introduction to Optical Mineralogy**, 3<sup>rd</sup> Edition, by William D. Nesse.
- In the bookstore (\$121.50)
  - This text will be used in this course and all petrology courses offered at Brock. It will serve as a handy reference for use in the real world after graduation.



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### 2P22 – REFERENCE TEXTS

- Available in the Library.
  - Bloss - An Introduction to the Methods of Optical Mineralogy
  - Kerr - Optical Mineralogy
  - Phillips - Mineral Optics, Principles and Techniques
  - Deer, Howie and Zussman - Rock Forming Minerals
    - A 7 volume set, invaluable to petrologists.
  - Deer, Howie and Zussman - Introduction to Rock Forming Minerals
    - A condensed version of the 7 volume set.

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### 2P22 - EVALUATION

- Labs                    30%
- Lab Exam            15%
- Spotting Quiz        5%
- Midterm               15%
- Final Exam            35%

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### General Course Information

- 1. 23<sup>rd</sup> time I have offered this course
- 2. Class size has ranged from 3 to 19
- 3. Average mark ranges from 63 to 77, highest 95
- 4. 8 failures

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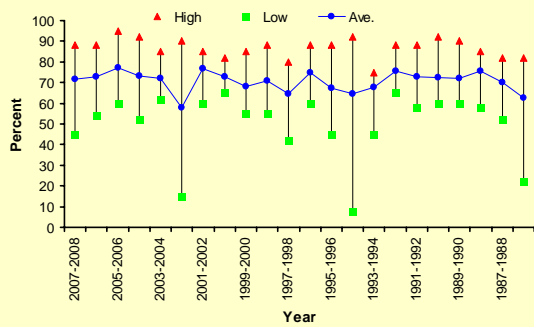
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### ERSC 2P22 – Final Grades



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### 2P22 - LECTURES

- Properties of light
- Refractometry
  - Relief, Becke Line, RI determination
- Isotropic Materials
  - Optics
- Anisotropic Minerals
  - examination of the various characteristics and properties of anisotropic minerals useful in their identification.

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**2P22 - LECTURES**

- Uniaxial Optics
  - Uniaxial Indicatrix, Interference Figures, Optic Sign determination
- Uniaxial minerals
  - Quartz, apatite, nepheline, calcite, zircon, apatite, tourmaline
- Biaxial Optics
  - Biaxial Indicatrix, Interference Figures, Optic Sign determination
- Biaxial Minerals
  - olivine, pyroxenes (orthopyroxene, clinopyroxene), amphiboles (hornblende, tremolite - actinolite), micas (biotite, muscovite), plagioclase, alkali feldspars.

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**NO CLASSES**

- Monday, January 26, 2009
- Monday, February 9, 2009

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**2P22 - LABS**

- TA – Matt McMahon (mm03na@brocku.ca)
- The lab component of this course accounts for 50% of the final grade;
  - 30% for the labs;
  - 5 % for spotting quiz
  - 15% for the lab exam.
- **You should be prepared to spend, on average, one additional hour per week, outside the scheduled lab period, working on lab assignments.**
- I have an open door policy and if I am in my office, and not busy, I am available to assist you with problems.

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### 2P22 - LABS

Topics to be covered:

- Mineral Optics
  - petrographic microscope
  - interaction of light with minerals
- Mineral Identification
  - 8-10 major minerals or mineral groups
- Identification of Unknowns
  - With techniques learned for knowns, you will be able to identify an unknown mineral – lab exam

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### 2P22 – LAB SCHEDULE

- Introduction to the Petrographic Microscope
- Becke Line and Refractive Index Determination
- Double Refraction and Refractive Index
- Uniaxial Minerals - Refractive Index Determination
- Uniaxial Minerals - Interference Figures
- Uniaxial Minerals - Identification, Refractive Index Quiz
- Biaxial Minerals - Optical Properties and Indicatrix
- Biaxial Minerals - Interference Figures
- Pyroxenes - Optical Properties and Identification
- Amphiboles and Micas - Optical Properties and Identification
- Feldspars - Optical Properties and Identification
- Lab Exam - Spotting Quiz and Mineral Identification

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### 2P22 Lab Regulations

- Labs are to be completed individually, i.e. no group work to be submitted
- Microscopes will be assigned in the first lab. Failure to return the microscope key will result in a grade of 35F for the course.
- If you cannot not submit a lab on the due date due to a medical condition, you must complete and submit the Student Medical Certificate, available from:  
<http://www.brocku.ca/healthservices/exemption.php>

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### 2P22 Lab Regulations

- Labs are to be submitted directly to the Instructor at the Friday Lecture
- Late labs will be subject to a 20% per day penalty and will not be accepted after 5 days
- Late labs will not be accepted after that lab has been marked and returned

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### Academic Conduct

- Each student is responsible for their own work
- **Academic misconduct** is deliberate dishonesty and includes, but is not limited to, the following forms:
  - Impersonation of a candidate in an exam or test.
  - Copying a laboratory report, or allowing someone else to copy one's report
  - Allowing someone else to do the laboratory work.
- **Plagiarism** means presenting work done (in whole or in part) by someone else as if it were one's own. Associate dishonest practices include faking or falsification of data, cheating, or the uttering of false statements by a student in order to obtain unjustified concessions (FHB, III 15.1)
- It is your responsibility to understand what constitutes academic misconduct. For information on the various kinds of academic dishonesty please refer to the current Brock University Undergraduate Calendar. (<http://www.brocku.ca/webcal/current/undergrad/areg.html#sec17>)

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