

ERSC 3P21

**Igneous and
Metamorphic Petrology**

2009-10

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**ERSC 3P21- IGNEOUS AND
METAMORPHIC PETROLOGY**

Course Description:

Igneous rocks: nomenclature and classification;
magmatic processes

Application of one, two and three component phase
diagrams to interpret the formation of igneous rocks

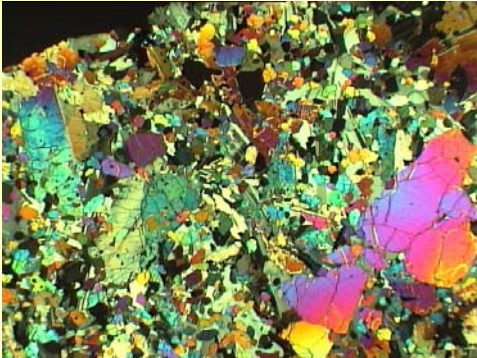
Metamorphic rocks: types, classification, mineral
parageneses

Labs: the study of rocks in thin section, their
mineralogy, textures, origin and classification.

Prerequisites:

ERSC 2P22 and CHEM 1F92

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3P21 - Objectives

1. Introduction and application of **PHASE CHEMISTRY** to igneous rocks
Relate the direct results of experimental work to the study of natural processes
2. Igneous rock forming processes
An attempt to predict where igneous rocks originate and how they evolve by post-melting processes – differentiation
3. Metamorphic processes
Classification, lithologic types
4. Develop a working knowledge of common mineral associations in classes or groups of igneous and metamorphic rocks
In Laboratory

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3P21 - Introduction

- Greg Finn
– ST 13th Floor Greg.Finn@brocku.ca
- Lectures
– Monday, Wednesday and Friday
– 8:00 – 9:00 a.m. in D319
- Laboratory
– Thursday
– 2:00 - 5:00 in D308

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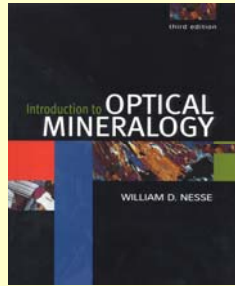
3P21 - WEBSITE

- The home page is at:
<http://www.brocku.ca/earthsciences/people/gfinn/petrology/3P21.htm>.
- Please let me know if there are problems with these pages.
- E-mail contact
– I will only be using Brock Badger accounts to communicate with students.

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3P21 - TEXT

- **Lectures:**
 - no specific text for the lectures
- **Labs:**
 - **Introduction to Optical Mineralogy**, 3rd Edition, by William D. Nesse.
 - Used in ERSC 2P22



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3P21 – Supplementary Texts

Available in the Library

- **Petrography and Petrology**
 - Philpotts – Petrography of Igneous and Metamorphic Rocks
 - Blatt and Tracy - Petrology, Igneous, Metamorphic and Sedimentary
 - Hall - Igneous Petrology
 - Yardley - An Introduction to Metamorphic Petrology
 - Cox, Bell and Pankhurst - The Interpretation of Igneous Rocks
 - Hatch, Wells and Wells - Petrology of the Igneous Rocks
 - Mason - Petrology of the Metamorphic Rocks
 - Best - Igneous and Metamorphic Petrology
 - Spry – Metamorphic Textures

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3P21 – Supplementary Texts

Available in the Library

- **Phase Diagrams and Thermodynamics**
 - Ernst - Petrologic Phase Equilibria
 - Ehlers - The Interpretation of Geological Phase Diagrams
 - Wood and Fraser - Thermodynamics for Geologists

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3P21 - EVALUATION

- Labs 30%
- Lab Exam 15%
Thursday November 26, 2009, 2:00-5:00 FIXED
- Assignments (3) 10%
- Midterm 10%
Date – Friday October 16
- Final Exam 35%
Date – TBC

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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/web/cal/current/undergrad/areg.htm#sect17>)

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Important Dates

- Friday October 30 – date by which you will know 15% of your final grade
- Friday November 6 – Last date for withdrawal without academic penalty

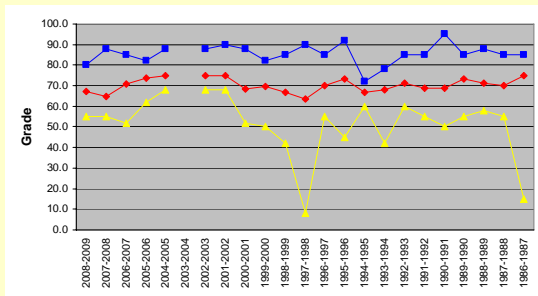
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3P21 -General Information

- 22nd time I have offered this course
- Class size varies from 3 to 18
- Average mark ranges from 66 to 75
- Highest mark awarded 95
- Lowest mark awarded 8
- 5 failures

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3P21 – Final Grades



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3P21 - LECTURES

Three Parts:

- Igneous Rocks
- Phase Diagrams and Phase Chemistry
- Metamorphism

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3P21 - Assignments

Three Assignments:

- Binary Phase Diagrams – simple and complex
- Ternary Phase Diagrams – simple
- Ternary Phase Diagrams - complex

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3P21 - Class Cancellations

No Lectures

- Friday September 18
- Wednesday October 14

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3P21- LABS

- The lab component of this course accounts for 45% of the final grade;
 - 30% for the labs;
 - 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.**
- Lab Hours - I will be available in D416 on Mondays from 12:00 to 1:00 .

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3P21- LABS

Topics to be covered:

- Mineral Identification
 - Those you can identify:
 - quartz, plagioclase, alkali feldspar, olivine, cpx, opx, hornblende, biotite, muscovite, chlorite, garnet, calcite, apatite, nepheline, zircon, tourmaline
 - Those you will learn to identify:
 - actinolite, epidote, chlorite, serpentine, sericite, staurolite, kyanite, sillimanite, andalusite, etc.
 - PLUS any others
- Plagioclase Compositions
 - 5 different methods will be covered
- Igneous Lithologies
 - Mineralogy, textures and structures
- Metamorphic Lithologies
 - Mineralogy, textures and structures

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3P21 – LAB SCHEDULE

- Sep 10 Plagioclase Feldspars - compositions and orientations
- Sep 17 Igneous Rocks - textures and mineralogical associations
- Sep 24 Plagioclase compositions, continued
- Oct 1 Petrology Report – Igneous Rocks
- Oct 8 Mafic Lithologies
- Oct 15 Intermediate Lithologies
- Oct 22 Felsic Lithologies
- Oct 29 Ultramafic and Feldspathoidal lithologies
- Nov 5 Metamorphic Rocks - mineralogy, textures and structures
- Nov 12 Pelitic lithologies
- Nov 19 Metabasites
- Nov 26 Lab Exam

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3P21 - Lab Regulations

- All labs are to be in my mail slot in Earth Sciences by 4:00 pm on the Monday, immediately following the lab period
- Late labs will be subject to a 20% per day penalty
- Late labs will not be accepted after that lab has been marked and returned
- Microscopes will be assigned in the first lab. Failure to return the microscope key will result in a grade of 35F for the course.

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