

**ERSC 3P21**

**Igneous and  
Metamorphic Petrology**

**2015-16**

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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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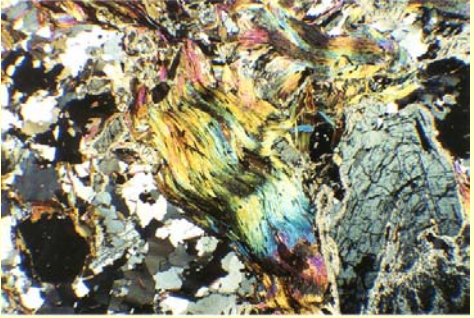
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### 3P21 - Objectives

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 13<sup>th</sup> Floor [Greg.Finn@brocku.ca](mailto:Greg.Finn@brocku.ca)
- Lectures  
– Monday, Wednesday and Friday  
– 8:00 – 9:00 a.m. in D319
- Laboratory  
– Monday  
– 2:00 - 5:00 in D308

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### 3P21 - WEBSITE

- The home page is at:  
<http://www.brocku.ca/mathematics-science/departments-and-centres/earth-sciences/people/gregory-c-finn/igneous-and-metamorphic-petrology>
- 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**, 3<sup>rd</sup> or 4<sup>th</sup> 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
  - MacKenzie and Guilford – Atlas of Rock Forming Minerals

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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 (11) 30%
- Lab Exam 15%  
**Monday November 30, 2015, 2:00-5:00 FIXED**
- Assignments (3) 10%
- Midterm 10%  
Wednesday October 28, 2015 8:00-9:00 FIXED
- Final Exam 35%

TBA

Students are expected to attend lectures and labs and must submit all labs and assignments in order to pass this course.

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### Academic Integrity

- Because academic integrity is important to the well-being of the academic community, Brock University takes academic misconduct very seriously. Academic misconduct includes plagiarism, which involves presenting the words and ideas of another person as if they were your own, and other forms of cheating such as copying answers or using crib notes during a test.
- The penalties for academic misconduct can be very severe. A grade of 0 may be given on the assignment or on the course, and a second offence may result in suspension from the University.
- Students are urged to read the section of the Brock University calendar that pertains to academic misconduct.  
(See: <http://www.brocku.ca/webcal/2014/undergrad/areg.html#sec67>)

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### Academic Accommodation I

- As part of Brock University's commitment to a respectful work and learning environment, the University will make every reasonable effort to accommodate all members of the university community with disabilities.
- If you require academic accommodations related to a documented disability to participate in this course, you are encouraged to contact Services for Students with Disabilities in the Student Development Centre (4th floor Schmon Tower, ex. 3240).
- You are also encouraged to discuss any accommodations with the instructor well in advance of due dates and scheduled assessments.

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## Academic Accommodation II

- Brock University acknowledges the pluralistic nature of the undergraduate and graduate communities such that accommodations will be made for students who, by reason of religious obligation, must miss an examination, test, assignment deadline, laboratory or other compulsory academic event.
- Students requesting academic accommodation on the basis of religious obligation should make a formal, written request to their instructor(s) for alternative dates and/or means of satisfying requirements.

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## Medical Exemption Policy

- The University requires that a student be medically examined in Health Services, or by an off-campus physician prior to an absence due to medical reasons from an exam, lab, test, quiz, seminar, assignment, etc.
- Student Health Services will provide medical documentation only if:
  - Medically warranted (i.e., a simple cold is not medically warranted).
  - The student presents him/herself to Health Services before the exam.
  - The student is seen in the office the day of the exam, lab, etc.
- If your medical condition requires special consideration for academic activity (e.g., missed seminars or labs, assignment extensions, or examination/test rescheduling) and is on a day or at a time when Health Services is not open, then you must go to another medical facility to obtain the necessary written medical documentation, which is the completion of Brock University's Medical Certificate."
- The Medical Certificate can be found at
- <http://www.brocku.ca/health-services/policies/exemption>

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## Important Dates

- **Tuesday November 3**– date by which you will know 15% of your final grade
- **Tuesday November 10** – Last date for withdrawal without academic penalty

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### 3P21 -General Information

- 29<sup>th</sup> time I have offered this course
- Class size varies from 3 to 20
- Average mark ranges from 66 to 75
- Highest mark awarded 95
- Lowest mark awarded 8
- 6 failures

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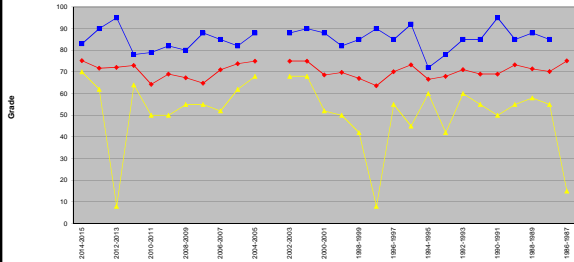
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### 3P21 – Final Grades



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### 3P21 - Lectures

#### Three Parts:

- Igneous Rocks
- Phase Diagrams and Phase Chemistry
- Metamorphism and Metamorphic Rocks

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### 3P21 - Assignments

#### Three Assignments:

- Binary Phase Diagrams – simple and complex
    - Due date: Before Midterm
  - Ternary Phase Diagrams – simple
    - Due Date: ~November 18, 2015\*
  - Ternary Phase Diagrams – complex
    - Due Date: ~December 2, 2015\*
- \* - Date dependant on lecture schedule

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### 3P21 - Class Cancellations

Before leaving home for class, check your Brock Email – if a class will be cancelled I will send a notice out in advance of the class.

In addition there will be no class on:

Wednesday November 25, 2015

**Friday December 4, 2015**

**Monday December 7, 2015**

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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.**
- TA is Andrea Krueger, and her e-mail address is [andreakru@yahoo.com](mailto:andreakru@yahoo.com)

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### 3P21- Labs

**Topics to be covered:**

- Mineral Identification
  - Those you can identify:
    - quartz, plagioclase, alkali feldspar, olivine, cpx, opx, hornblende, tremolite-actinolite, biotite, muscovite, chlorite, garnet, halite, fluorite, calcite, apatite, nepheline, zircon, tourmaline
  - Those you will learn to identify:
    - epidote, serpentine, iddingsite, sericite, volcanic glass, staurolite, kyanite, sillimanite, andalusite, cordierite,
  - 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 14 Plagioclase Feldspars - compositions and orientations
- Sep 21 Plagioclase compositions, continued
- Sep 28 Igneous Rocks - textures and mineralogical associations and Petrology Report
- Oct 5 Mafic Lithologies
- **Oct 12 Fall Break Week – No Lab**
- Oct 19 Intermediate Lithologies
- Oct 26 Felsic Lithologies
- Nov 2 Ultramafic and Feldspathoidal lithologies
- Nov 9 Metamorphic Rocks - mineralogy, textures and structures
- Nov 16 Pelites.
- Nov 23 Metabasites
- Nov 30 Lab Exam
- Dec 7 No Lab

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### 3P21 - Lab Regulations

- All labs are to be handed directly to me at the end of the Monday lecture, 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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