

## GEL4050 Igneous and Metamorphic Petrology Petrographic Rock Project

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### PROJECT SUMMARY

The Petrographic Rock Project is a semester-long project in which each student collects an igneous or metamorphic rock during an early fieldtrip, and follows all of the steps a petrologist would take to interpret an igneous or metamorphic rock from an unknown area. This project runs in the background of the petrology class during the initial part of the semester while the student acquires the petrologic skills to make more sophisticated interpretations. The culmination of the project is for each student to spend several hours with the instructor in using appropriate tools such as thinsectioning and optical microscopy, XRF analysis, Whole Rock geochemistry and possibly XRD & SEM EDX investigations that aid in the interpretation of the rock. Ultimately, the student interprets the rock, generally with the assistance of the instructor, writes a report explaining the process and results and presents the results to the class.

### GOALS OF THE PROJECT

This project is designed to give petrology students experience in the methods and approaches taken by petrologists to solve a petrologic problem. This project ranges from the basic descriptive aspects to very sophisticated utilization of SEM and X-ray technology i.e. it follows the processes often used in petrology research.

### TIMELINE AND LOGISTICS OF THE PROJECT (based on a 15-week semester)

#### Week 4: Fieldtrip Day - collecting the samples

During our initial fieldtrip each of you will selected a rock sample of interest. You may work in pairs for lab and data analysis, but the final write-up has to be specifically yours. In the field you should write up detailed observations about the sample, its location and geographic surrounding in your field notebook. A copy of your field notebook entries are to accompany your final project. When working in the lab you are responsible for that rock throughout the semester, which means you should have a safe place for storage. Please label and catalog your rock accordingly.

TASK(S):  Note Book Entry  Sampling / Labeling Procedures

#### Week 5 - 6: Description of the hand sample and cutting the rock.

Your handsample should be prepared to have a cut and polished side (see picture). The polished side will be a great aid in describing and identifying individual minerals in your handsample. The trimmed off part will be used for geochemistry work and making a quality thin section of your sample. Make sure that all pieces of the cut rock are labeled and the rock preparation lab is cleaned properly.

Take pictures of your polished slab to be used as a figure in your write-up. Describe your handsample in detail, including texture.

Identify the visible minerals and describe. Label these minerals in your photograph using approved abbreviations. Also do a handsample analysis (point count) of mineral percentages in your sample.

TASK(S):  Labeled Photograph  Description / Mineral %



**Week 5 - 6: Composite sample and geochemical analysis**

Part of your handsample should be pulverized for geochemical work. It is proposed that each sample will be processed for Whole Rock geochemistry by [Acme Analytical Laboratories Ltd.](#). For this you will crush and pulverize a sample split to 200 mesh resulting in a 10g powdered composite sample. This sample must be labeled and will be mailed to Vancouver where it will analyzed using hot acid digestive techniques and ICP-MS instruments. Turn-around time is usually 3 - 4 weeks. Therefore mailing the sample in a timely fashion should yield analytical results by week 9 or 10.

TASK(S):  Have sample prepped to specifications on time

**Week 5-8: Thinsectioning & optical microscopy**

Prepare a quality thin section of your sample. If many opaque minerals are present you may want to opt for a polished section. You also may produce a second STAINED section to aid in mineral identification. You should take a photograph of your section in plain polarized and cross polarized light.

During the optical investigation you should identify and describe each mineral found. Note special characteristics such as zoning, dissolution, or preferred orientation. If possible, do a point count analysis. Infer any diagenetic processes and sequence of events (What crystallized first?).

TASK(S):  Labeled Photograph  Description / Mineral %  
 Diagenetic Interpretation

**Week 7-9: Additional work (XRF, XRD, SEM)**

As desired, XRD and XRF analysis can be performed. If ICP results are available, a calibrated quantitative XRF scan can be performed on your sample and possibly even in the field. Please record all collected data and use it in your final interpretation and write-up.

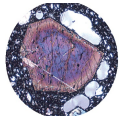
**Week 9 -11: Rock classification using ALL available data**

During this time you should be able to identify and classify your rock sample using ALL available data. This should include normative calculations, diagram plottings, and phase diagrams. You should also assess the thermobarometries of your sample using appropriate methods.

**Week 11-15: Final report**

Each student produces a 5 page report, exclusive of images and analyses, which summarizes what they learned and what it means in the geologic context of the sample. You also will produce an index card with pertinent data, which will be added to your specimens.

***NOTE: Submittal of the Project for a possible "A" grade is during week 11!***



## GEL4050 Igneous and Metamorphic Petrology Petrographic Rock Project

Name: \_\_\_\_\_

Section: \_\_\_\_\_

### **GRADING:**

Writing assignments must be turned in by the deadline indicated. **Read the WRITING PRIMER in detail BEFORE you submit your paper.** Missed deadlines FOR ANY REASON will drop one letter grade as scheduled below with 0% F for work submitted past the final deadline.

**I will read your paper until I come to the 10<sup>th</sup> fault in layout, grammar, spelling, content, concept, format, presentation, expression, design, citation, etc. (Be aware that repeat mistakes will count MORE THAN ONCE!) I will then stop reading / grading, unceremoniously return your work for revision and drop you one full letter grade. Revisions have to be returned by the next deadline and the process is repeated. You will drop one full letter grade every time I reach more than 9 mistakes or if you submit your paper PAST the indicated deadlines. Work submitted past the FINAL SUBMITTAL deadline **will ALWAYS receive a 0% F. You have been warned!****

**NO REVIEW OF YOUR PAPER BY THE INSTRUCTOR BEFORE SUBMITTAL. PROOFREADING IS ENTIRELY YOUR JOB. YOUR GRADED SUBMITTAL WILL BE THE INSTRUCTOR'S REVIEW OF YOUR WORK!**

### CHECKLIST:

Write-up must include the following for full credit [Abbreviation with point deduction]:

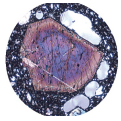
- Grading Sheet [GS-1]
- Title Page [TP-1]
- Introduction [I-3]
  - Figure: Map (Location) [<sub>r</sub>ML-3]
  - Figure: Map (Geology) [<sub>r</sub>MG-3]
- Methods / Procedures for Data collection and analysis [MPD-5]
- Data Description and Discussion [DD-3]
  - Figure: Thin Section Photomicrograph w/ Mineral ID [<sub>r</sub>TS-3]
  - Figure: Polished Rock Segment Photo w/ Mineral ID [<sub>r</sub>PR-3]
  - Table: Geochem Table (oxides) [<sub>r</sub>G-3]
  - Figure: P/T or Diag. Diagram(s) [<sub>r</sub>PT-3]
- Conclusion(s)[C-3]
  - Figure: Classification [<sub>r</sub>CI-3]
- Full Citations (at least 3) [Cit-3]

Index card must include the following:

- Rock Name 5pts
- Date collected 5pts
- Location (Geographic) 5pts
- Location (Stratigraphic) 5pts
- Minerals observed / identified/ calculated 10pts
- Oxide Geochem Data 10pts

OVERALL PROJECT & SPECIMENS:

- Fieldnotes 20pts
- Handsample Specimen w/ polished side 15pts
- Thinsection to specifications 15pts



**THIS SHEET IS TO BE RETAINED & ATTACHED TO FRONT OF EVERY SUBMITTAL OF YOUR ASSIGNMENT  
WARNING!!! NO ASSIGNMENT ACCEPTED WITHOUT THIS SHEET!!! WARNING!!!**

**PROJECT GRADING RUBRIC**

Name:	Course ID:
Overall FINAL Grade:	%
	/300

GS-1 TP-1 I-3 ML-3 MG-3 MPD-5 DD-3 TS-3 PR-3 G-3 PT-3 C-3 CI-3 Cit-3

*Copy deadline dates and times from calendar here!*

# PART I Grading - Write Up

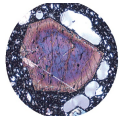
<b>A</b>	<p><b>1<sup>st</sup> SUBMITTAL</b> <input type="checkbox"/>GS <input type="checkbox"/>TP <input type="checkbox"/>I <input type="checkbox"/>ML <input type="checkbox"/>MG <input type="checkbox"/>MPD <input type="checkbox"/>DD <input type="checkbox"/>TS <input type="checkbox"/>PR <input type="checkbox"/>G <input type="checkbox"/>PT <input type="checkbox"/>C <input type="checkbox"/>CI <input type="checkbox"/>Cit</p> <p>Comments:</p> <p>Mistakes</p> <p>0    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p> <p>100   98    97    96    95    94    93    92    91    90</p> <p>Percent</p>	<b>Deadline to receive A:</b>
<b>B</b>	<p><b>2<sup>nd</sup> SUBMITTAL</b> <input type="checkbox"/>GS <input type="checkbox"/>TP <input type="checkbox"/>I <input type="checkbox"/>ML <input type="checkbox"/>MG <input type="checkbox"/>MPD <input type="checkbox"/>DD <input type="checkbox"/>TS <input type="checkbox"/>PR <input type="checkbox"/>G <input type="checkbox"/>PT <input type="checkbox"/>C <input type="checkbox"/>CI <input type="checkbox"/>Cit</p> <p>Comments:</p> <p>Mistakes</p> <p>0    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p> <p>89   88    87    86    85    84    83    82    81    80</p> <p>Percent</p>	<b>Deadline to receive B:</b>
<b>C</b> through <b>F</b> (>0)	<p><b>FINAL SUBMITTAL</b> <input type="checkbox"/>GS <input type="checkbox"/>TP <input type="checkbox"/>I <input type="checkbox"/>ML <input type="checkbox"/>MG <input type="checkbox"/>MPD <input type="checkbox"/>DD <input type="checkbox"/>TS <input type="checkbox"/>PR <input type="checkbox"/>G <input type="checkbox"/>PT <input type="checkbox"/>C <input type="checkbox"/>CI <input type="checkbox"/>Cit</p> <p>Comments:</p> <p>79 - number of faults = GRADE PERCENT</p> <p>79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46</p>	<b>Deadline to receive C - F(&gt;0):</b>

**Assignments received AFTER the last deadline for ANY REASON will be counted as "missing" and will receive a 0% F!**

Calculation of PART I PROJECT GRADE - Write-Up:

**Part I GRADE PERCENT × 2.0 = Part I PROJECT POINTS**

× 2.0 =



## PART II Grading - Segments

1.	<b><u>OVERALL PROJECT and SPECIMENS</u></b>		
	<input type="checkbox"/> Fieldnotes	___/20pts	
	<input type="checkbox"/> Handsample Specimen w/ polished side	___/15pts	
	<input type="checkbox"/> Thinsection to specifications	___/15pts	_____/50pts
2.	<b><u>INDEX CARD</u></b>		
	<input type="checkbox"/> Rock Name	___/05pts	
	<input type="checkbox"/> Date collected	___/05pts	
	<input type="checkbox"/> Location (Geographic)	___/05pts	
	<input type="checkbox"/> Location (Stratigraphic)	___/05pts	
	<input type="checkbox"/> Minerals observed / identified/ calculated	___/10pts	
	<input type="checkbox"/> Oxide Geochem Data	___/10pts	_____/50pts
<b>PART II Segments TOTAL</b>			_____/100pts
<b>PART I Write-Up TOTAL</b>			/200pts
<b>GRAND TOTAL - FINAL GRADE</b>			_____/300pts _____%