CAMOSUN COLLEGE	***School of Arts & Science*** ***CHEMISTRY AND GEOSCIENCE DEPARTMENT*** **GEOS 260-001** **Introduction To Petrology** **Semester/Year, 2009W**

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

Ω *Please note: this outline will be electronically stored for five (5) years only.*
It is strongly recommended students keep this outline for your records.

1. Instructor Information

(a)	Instructor:	Dr. Tark Hamilton		
(b)	Office Hours:	11:30-12:20 M,W,F; 1:30-2:20 M,T,F;		
(c)	Location:	Fisher 344A (M-T-W-F)		
(d)	Phone:	250-370-3331	Alternative Phone:	
(e)	Email:	hamilta@camosun.bc.ca		
(f)	Website:	Under construction		

2. Intended Learning Outcomes

This section is under revision to match curriculum changes at U. Vic. & U.B.C. for the equivalent courses.

Upon completion of this course the student will be able to:

1. Distinguish igneous, metamorphic and sedimentary rocks by their texture and mineralogy.
2. Identify at least 30 common rock types in hand specimen and thin section, along with their dominant textures.
3. Describe the relationship between field relations, textures and environmental conditions of formation.
4. Use a polarizing microscope to identify common rock types, minerals and textures in thin sections.
5. Write a petrographic report for common types of igneous and metamorphic rocks.
6. Relate textures and grain sizes in igneous rocks to their formative processes: intrusive vs. extrusive and be able to infer the original position in the crust, the geologic and tectonic setting.
7. Compare and relate natural igneous textures to simpler chemical systems and “model” magmas.
8. Describe the various types of magmatic processes and the textural and compositional evidence for partial melting, magmatic transport, contamination, mixing, cooling and crystallization.
9. Interpret sequences of igneous rocks in terms of the three prevalent settings for magma generation: divergent-rift, convergent-arc and within-plate.
10. Relate metamorphic textures and mineralogy to the three dominant metamorphic suites: regional (P,T,Strain), contact (T,fluids) and dynamic (Strain).

11. Infer geo-tectonic settings for the metamorphic types listed above: convergent margin, thermal/baking at an igneous contact, and near a fault zone or impact site.
12. Measure, plot and interpret strain directions and past forces from lineations, foliations, shear zones and other kinematic indicators.
13. Relate detailed textural sequences of porphyroblasts, reaction relations and fabrics to unraveling the sequence of: time, strain and recrystallization.
14. Relate the index minerals and facies concept to bulk composition of parent rock, equilibrium and Gibb's Phase Rule, and be able to read or represent different metamorphic rocks graphically in chemical diagrams.
15. Relate suites of metamorphic rocks which are produced to the common bulk compositions: seafloor; oceanic basalts and greywackes, carbonates and marls, Convergent Margin; mud and sand rocks, volcanic and plutonic rocks.
16. Apply 2 mineral geothermometers and geobarometers to calculating the formative conditions for common igneous and metamorphic rocks.
17. Distinguish clastic, chemical and biochemical sediment types as precursors for metamorphism or contaminants for igneous and magmatic processes.
18. Relate the rock cycle, chemical and mechanical weathering conditions, hydrothermal or deuteric overprints from primary igneous and metamorphic textures and mineral assemblages.
19. Relate ore grade mineralization in hand specimen to common ore deposit models and host rock suites: porphyries, skarns, volcanogenic massive sulphides (VMS), and sedimentary massive sulphides (SMS).

3. Lab Topics and Suites of Rocks and Thin Sections. (Each lab will consist of 2-3 parts, hand specimens, thin sections, calculations or graphical exercises. 2 rock suites of 6-8 specimens are combined for most labs.)

Igneous Suites

1. Introduction/Review of igneous minerals in hand specimen and thin section: forms, cleavage, fracture, association and petrographic microscope. Feldspars, feldspathoids, pyroxenes, amphiboles, micas, garnet, glass, opaque minerals. Recognition and distinction of different minerals.
2. Introduction/Review of optical mineralogy and igneous minerals in thin section: anisotropic versus isotropic minerals and substances, optical mineralogy and compositional measurements of plagioclase, alkali feldspar, clinopyroxenes, orthopyroxenes and olivine.
3. 20 Plutonic and volcanic rock examples, modes and classification. Example petrographic reports for volcanic and plutonic rocks.
4. Layered Mafic – Ultramafic Intrusions I – Tulameen Complex, Princeton B.C. Dunite, pyroxenite, gabbro, diorite & associated chromite, sertpentine and PGE mineralization.
5. Layered Mafic – Ultramafic Intrusions II – Giant Mascot Ni Mine, Southern B.C. Peridotite, Gabbro, Hornblendite and later Spuzzum Pluton. Associated Nickel, Cu and PGE mineralization.
6. Mafic rocks of Seafloor I – MORB: Mid Atlantic Ridge 12°N to 45°N, Barracuda Scarp, Puerto Rico Trench, and ARC: Puerto Rico, Martinique, Mt. Pelee.
7. Mafic Rocks of Seafloor II – MORB and Intraplate, Juan de Fuca, Explorer Ridge, Paul Revere Ridge, Tuzo Wilson Seamount, Denson Seamount, Patton Seamount.
8. Phase diagrams and thermodynamic calculations.
9. Intermediate Plutonic Rocks – Mesozoic and Tertiary Calc-Alkaline and Alkaline intrusions from the Cordillera: Stikinia, Quesnellia, Wrangellia

examples and associated ore deposits: Highland Valley, Afton, Mt. Washington.
10. Within Plate and Arc volcanics from Cordillera: Level Mtn, Ootsa Lake, Chilcotin, Cascades.

Metamorphic Suites

1. Introduction to metamorphic minerals in hand specimen and thin section.
2. Classifying metamorphic rocks and recognizing textures and minerals in hand specimen and thin section. Regional, Contact, Strain and Hydrothermal types.
3. Regional Metamorphic Rocks: World examples
4. Regional Metamorphic Rocks Leech River- Pacific Rim Terrane
5. Regional Metamorphic Rocks – Atlin region
6. Regional metavolcanics, Snow Lake Belt, Manitoba
7. Contact metamorphic rocks and skarn deposits: Del Santo Deposit Telkwa
8. Hydrothermal and skarn rocks: Eastern Cordillera
9. Blueschists and Eclogites: Cordillera and Klamaths
10. Metamorphic phase diagrams, tie lines and thermodynamic calculations.

4. Field Trips: 2 half day to day trips and 1 weekend field trip required.

out of class requirements – 2 1 day field trips announced 2 weeks in advance, overnighter will be late in term.

5. Required Materials

- Texts: An Introduction to Igneous & Metamorphic Petrology, by John D. Winter, 2001, Prentice Hall
- Suggested: Mineralogy, 2nd ed. Dexter Perkins, Prentice Hall, 2002
- Suggested: Minerals in Thin Section, Dexter Perkins and Kevin Henke, 2nd ed., 2004

(b) Other: hand lens, knife, magnet

6. Course Content and Schedule

class hours: 9:30-10:20 Mon& Fri F300, Wed F354

Lab: Tues 9:30-12:20 - Fisher 300 or computer lab F358

7. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

25 %: 10 labs & homework or prelab assignments

40%: 3 midterm tests or lab practicums during lab periods.

15%: 1 term paper on a related suite of rocks. E.g. Peralkaline granites, low grade metamorphism of marine volcaniclastic rocks form an igneous or metamorphic topic. Include any associated mineral ores or economic resources, geological setting, paragenesis, environmental issues, consequences for Canadian Economy. This paper is due in completed written and power point form by the start of week 12. Earlier submissions get free guidance and feedback.

20%: Written final exam as scheduled by Registrar

8. Grading System

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	1
0-49	F	Minimum level has not been achieved.	0

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy E-1.5 at **camosun.ca** for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	*Incomplete*: A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	*In progress*: A temporary grade assigned for courses that, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. *(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)*
CW	*Compulsory Withdrawal:* A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.

9. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services or the College web site at camosun.ca.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**.
It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services and on the College web site in the Policy Section.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED