



**School of Arts & Science
CHEMISTRY AND GEOSCIENCE DEPARTMENT**

**GEOS 100-002
Physical Geology
Environmental Geology Emphasis
2007 Winter 2007**

COURSE OUTLINE

The Approved Course Description is repeated here from the College web site

GEOS 100 Physical Geology

- (4 credits) F, W (3,3,0,0)

The origin, composition, age, and processes of Earth are introduced. We study mineral and rock composition, and properties, rock-forming processes, geologic structures, earthquakes, and the plate tectonic model. We apply this knowledge to the geology of BC. A weekend field trip is optional. Previous study of chemistry is an asset. (T)

Prerequisite(s): English 12 **or** assessment.

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 S. Hamilton | | |
| (b) | Office Hours: | Mon, Tues, Thurs, Fri, 11:30am-12:30pm and by appointment | | |
| (c) | Location: | Fisher 344-A | | |
| (d) | Phone: | 370-3331 | Alternative Phone: | |
| (e) | Email: | hamilta@camosun.bc.ca (read Monday–Thursday until 1:30pm & Friday until 3:30pm) | | |
| (f) | Website: | Under construction | | |

2. Intended Learning Outcomes

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

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

1. Analyze minerals for common physical properties.
2. Identify common rock-forming minerals on the basis of their properties.
3. Infer how samples of some rocks have formed.
4. Infer the relationship of rock-forming processes to plate tectonics.
5. Describe and interpret textural features of rocks.
6. Describe compositional features of rocks.
7. Classify common rocks based on texture and composition.

8. Apply techniques to determine the chronological order of events in Earth's history.
9. Calculate absolute ages of Earth materials and events.
10. Identify common geologic structures and use symbols to represent such structures on maps.
11. Identify, describe and interpret geological structures in three dimensions.
12. Determine the relationship of geological structures and plate tectonic boundaries.
13. Determine the location of an earthquake from seismic data.
14. Use seismograms to infer relative earth movements on faults.
15. Relate the nature and distribution of major earth features such as mountains, volcanoes and earthquakes to plate tectonics.

3. Required Materials

(a) Required Texts

Canadian Edition **Earth: An Introduction to Physical Geology**, E.J. Tarbuck, F.K. Lutgens and C.J. Tsujita, Prentice Hall 2005. (Note: this is a new book with >40% new content and Canadian examples. All of my test questions are based on this text.)

Laboratory Manual in Physical Geology, AGI, 7th edition of Busch and Tasa

Recommended reading of other geology texts, a geological glossary (dictionary), a mineral identification book and web based research, readings, real and virtual field trips.

Earth: Animations Library on CD ROM (available in new packaged edition only)

(b) Other

Hand lens (needed in first 4 labs and field trips), protractor, drawing compass, coloured pencils (all needed for labs 4 onward for drawing and colouring).

2 half day weekend field trips are required on a Saturday or a Sunday, announced 2 weeks in advance. These integrate your course learning with field observations.

4. Course Content and Schedule

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

Instruction 14 weeks

Classroom 3 hours 9:30-10:20 Mon, Tue & Fri F300

Lab 3 hours Wed – 9:30-12:20 F300 (**Lab attendance is mandatory, must pass lab to pass course**)

Labs are due at the beginning of the following lab the week following their issue. If you ask in advance you might be able to attend Alan Gell's lab section before ours. There are no make up labs. Access to F300 is limited, use your lab time efficiently, most labs require 1 hour of reading prior to coming to the lab and 2-3 hours after the lab on your own to complete the exercises.

Local Field Trips during lab time & 2 weekend day trips **required** 2 weeks notice

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

- (a) **Lab exercises** (due in lab at the beginning of the following lab period) 11 X 2.5% (out of 10). There will not be time to work on old labs as there will always be new work assigned.
- (b) **3 Lab tests (1 hour practicums in lab along with lab assignments in weeks 5, 9 and 13 covering: mineral identification, rock identification and origin, tectonic problems)** 5%, 5%, 5%. Labs and lab tests combine to **25%** of course
- (c) **Written exams** Wk5: **10%**, Wk9: **15%**, Wk12: **25%** covering lectures to week prior
- (d) **Weekly pop quizzes on assigned readings and prior lecture notes may occur at beginning of each lab period or during Friday Lecture.**
- (e) **Short paper on a pre- approved geological journal article due ~wk8.** 5%
- (f) **Final exam cumulative as scheduled 25%.**
- (g) **If you do better on the final exam than a prior exam I will replace the lower mark and proportion with the mark from your final exam.**

6. Grading System

Standard Grading System (GPA)

| Percentage | Grade | Description | Grade Point Equivalency |
|------------|-------|--------------------------------------|-------------------------|
| 95-100 | A+ | | 9 |
| 90-94 | A | | 8 |
| 85-89 | A- | | 7 |
| 80-84 | B+ | | 6 |
| 75-79 | B | | 5 |
| 70-74 | B- | | 4 |
| 65-69 | C+ | | 3 |
| 60-64 | C | | 2 |
| 50-59 | D | | 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 at camosun.ca or information on conversion to final grades, and for additional information on student record and transcript notations.

| Temporary Grade | Description |
|-----------------|---|
| I | <i>Incomplete:</i> 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 | <i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course. |

| | |
|-----------|---|
| CW | <i>Compulsory Withdrawal:</i> 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. |
|-----------|---|

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.

7. Sequence of topics (subject to modification and repetition):

Week 1: (Lab 1: observations, errors, specific gravity & isostasy)& lectures from Ch1

Ch.1 (all) & Ch 20 (554-555), Ch 22

Intro: Geo-hazards, resources, environment, processes, products & population.
Internal processes, heat engine and plate tectonics. External (surficial processes)
Observations and Hypothesis Testing, The notion of "Deep Time", Isostasy, Planetary Geology and differences

**Week 2: (Lab 2 –Mineral introduction)
& continue intro.**

Week 3&4:Ch.2& 21 Matter & minerals: Elements, atoms, ions, Mineral compositions, crystal structure & physical properties. Mineral environments, assemblages & resources
(Lab 3 – Mineral Lab #2 and Introduction to Rocks)

Week 4&5: Ch.3,4& 21 Igneous rocks, volcanoes & plutons, and resources, magmas, properties, mineralogy, textures and environments of formation **(Lab 4)**

Ch.4 Volcanism, activity & landforms, textures, hazards, geothermal resources **(Lab 5)**

Midterm Exam 1: Ch1-4 in first part of Lab Week 5 (Wed Feb 7)

Ch.5& 9 Weathering mechanical and chemical, soil formation, erosion and mass wasting

Week 6: Ch.6 & 12-14 inclusive Sedimentary processes, environments, sediments, facies, rock types and resources plus parts of **(Labs: 6, 11, 12) and Ch.8** Geologic time: relative and absolute, geologic dating techniques **(Lab 8 on your own)**

Lab Quiz 1 on 20 of 50 minerals in first part of lab & Lab 6 (Feb 14)

Week 7: Complete Sedimentary environments and time labs, Paper prep time and rock study time in open lab and lecture periods for paper due next week and rock quiz in next week.

Week 8: Ch.7 & 15, 20, 21 Metamorphism, metamorphic rocks settings, textures, formation and resources **Lab 7**

Lab Quiz 2 on 20 of 50 Rocks in first part of Lab week 8 plus lab 7

Week 9: Ch.15 Crustal deformation, tectonics and structural geology, Geological Maps.)

Midterm Exam 2: Ch5-9 in first part of Lab 10 Week 9

Week 10: Ch.16 & 17 Earthquakes: types, recurrence, location, effects, tectonic settings, earthquakes in Western Canada, Geophysics & Earth's interior: Core, Mantle & Crust, Planetary formation, geotherms & heat flow **Lab 16**

Week 11-12: Ch.18-20 inclusive Plate tectonics, Ocean floor, basalts, active tectonics, ore formation, unique environments, plate boundaries and motions, mantle convection, Mountain building, evolution of continents, resources **Lab 2**

And Supplemental Lecture notes on: Canadian Geology and development of western Canada and local geology

Midterm 3: Ch16-20 inclusive (March 28)

Lab Quiz 3 in last week 13: practical exercises on geological time, structures, earthquakes and tectonics. (April 11)

Final Exam as scheduled by Registration.

8. Course purpose:

-To acquaint you with the physical make up of the solid mineral and rock matter and natural processes on and within the Earth with an emphasis on Canadian environments and resources. Always ask yourself what each topic has to do with: resources, hazards and the environment.

-To acquaint you with the vocabulary and processes of Earth science. You should learn to look at the world around you and see it with new critical and appreciative eyes. You should be able to appraise your local surroundings for intermittent and ongoing geological processes and hazards. You should be capable of hearing, seeing or reading scientific articles with understanding and appreciation.

-To make you a better informed citizen and capable of understanding Earth science issues as they relate to public policy, resource usage and the environment. What do you think about Canada being a net exporter of Oil, Gas, Coal. Uranium, Iron, Copper, Asbestos? Should we export our fresh water? How does resource extraction and use affect the environment? Should I buy vacation property at sea level on the West coast?

“Civilization exists by geological consent!” Mark Twain

Out of courtesy to people with asthma and other chemical sensitivities. No scented body products are permitted on the 3rd floor of Fisher. This is a scent free zone.

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.