

GEOS 100 PHYSICAL GEOLOGY Section 003 & 003Ie

Course Outline Fall 2004

Prerequisite: English 12, Chem 11 or Chem 060.

1. Instructor

Dr. Tark S. Hamilton Office Fisher 344-A

Phone 370-3331 email: (read Mon-Thurs 9-5)

Office Hours: as posted M,T,F 10:30-11:20, Th 2:30-3:20 or by appointment

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2. Intended Learning Outcomes

After successfully completing all components of this course students will be able to:

1. Recognize mineral names, physical properties, chemical composition, formation
2. Identify ~50 common rock-forming minerals on their physical properties
3. Infer how samples of some rocks have formed: process and conditions
4. Infer the relationship of rock-forming processes to plate tectonic settings
5. Describe & interpret textures of igneous, sedimentary & metamorphic rocks
6. Describe mineral & chemical variations of abundant rock types
7. Classify common rocks based on texture and composition
8. Relate a range of geological processes and identify their products
9. Understand the natural resources, their settings, limits, value and environments
10. Relate environmental conditions to geological settings and products
11. Apply techniques to determine the chronological order of events in Earth's history
12. Calculate absolute radiometric ages of Earth materials and events
13. Geological map reading, common structures & their representation.
14. Identify, describe, interpret and draw geological structures in three dimensions
15. Determine the relationship of geological structures and plate tectonic boundaries
16. Determine the location of an earthquake from seismic data
17. Use seismograms to infer relative earth movements on faults
18. Relate the nature and distribution of major earth features such as mountains, volcanoes and earthquakes to plate tectonics.
19. Know & use a geological & scientific vocabulary of ~2000 terms & definitions

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 testing is based on this text)

Lab. **Manual in Physical Geology**, AGI, Current edition 6th?, 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.

(b) Other

Hand lens, protractor, drawing compass, coloured pencils.

4. Instruction 14 weeks

Classroom 3 hours 9:30-10:20 M,W,Th, Mon F268, Tues F302, Fri F334

Lab 3 hours Tues – 9:30-12:20 F300 (*must pass lab to pass course*)

Labs are due at the beginning of lab the week following their issue. If you ask in advance you might be able to attend another lab section. There are no make up labs. Access to F300 is limited, use your lab time efficiently.

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

5. Assessment

(a) **Lab exercises** (due in lab at the end of lab period) 11 X 2.5%

(b) **3 Lab tests (1 hour practicums: minerals, rocks, tectonics)** 5%, 5%, 10%

(c) **Written exams** 15%, 15%, 25%

(d) **Weekly pop quizzes on assigned lab readings and prior lecture notes at beginning of each lab period**

(e) **Short paper on an approved geological journal article or topic due ~wk8.**

6. Grading system

Marking Scheme:

A+	100-95	A	94-90	A-	89-85		
B+	84-80	B	79-75	B-	74-70		
C+	69-65	C	64-60	D	59-50	F	<50

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

Week 1: field trip in lab, pre-test and 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 1: observations, errors, specific gravity and isostasy)& 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 -2 parts for weeks 3 and 4**)

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

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

Lab Quiz 1 on 20 of 50 minerals in first part of lab & Lab 6

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

Week 8: Ch.8 Geologic time: relative and absolute, geologic dating techniques (**Lab 8**)

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

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 & 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

Lab Quiz 3 in last week: practical exercises on geological time, structures, earthquakes and tectonics.

Note there are 14 weeks of classes. Due to field trips and coordinating with other sections and exams/quizzes the schedule will naturally fall a week or 2 behind and complete on time. E.G. don't skip 5 weeks of class and assume you'll know where we are or that you haven't missed an exam.

Final Exam as scheduled after mid October by Registration.

8. Course purpose:

-To acquaint you with the physical make up of 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 to 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.

Civilization exists by geological consent!