



## COURSE OUTLINE

The course description will be online @ <http://camosun.ca/learn/calendar/current/web/geos.html>

Ω Please note: the College electronically stores this outline for five (5) years only. It is **strongly recommended** you keep a copy of this outline with your academic records. You will need this outline for any future application/s for transfer credit/s to other colleges/universities.

### 1. Instructor Information

(a)	Instructor:	Dr. Tark Hamilton		
(b)	Office Hours:	9:30-10:20 M, W & F; Tues 12:30-1:20 and Thursday 1:30-2:20 or <b>by appointment only</b> : 10:30-11:20 M, W, & F		
(c)	Location:	E200		
(d)	Phone:	250-370-3331	250-216-6448	During Field Trips only.
(e)	Email:	<a href="mailto:hamiltont@camosun.bc.ca">hamiltont@camosun.bc.ca</a> read only Monday through Friday		
(f)	Website:	<a href="https://faculty.camosun.ca/tarkhamilton/">https://faculty.camosun.ca/tarkhamilton/</a> (under construction)		

### 2. Intended Learning Outcomes

(No changes are to be made to these Intended Learning Outcomes as approved by the Education Council of Camosun College.)

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

1. Describe and interpret short-term and long-term Geologic, Oceanic and Atmospheric processes and their interactions.
2. Make hypothesis-based scientific observations, analyze and interpret quantitative data with reference to Geologic, Oceanic and Atmospheric processes.
3. Comment on orbital motion and wave motion and apply standard equations to compute wave velocity.
4. Use simple laboratory equipment to study and measure wave velocity.
5. Utilize standard tide and current tables and software.
6. Interpret relationships among temperature, salinity and density of seawater, and how these properties vary over time.
7. Describe ocean current transport and be able to assess the role of currents in global heat transfer.
8. Describe relationships among surface ocean currents and atmospheric circulation.
9. Analyze grain size of sediment samples and interpret current environment and sedimentary environment of deposition from sediment data.
10. Determine salinity of water samples and the relationship of salinity to temperature, density and dissolved gases.
11. Comment on the energy budget of the atmosphere, and its short-term and long-term variability.
12. Comment on the chemical evolution of the atmosphere.
13. Describe coastal processes at the land-sea interface.
14. Relate ocean-floor topography and ocean depth data to processes of sea-floor spreading and the age of ocean basins.

### 3. Required Materials

- (a) Texts: **The Earth System**, 3rd Ed. by **Kump, Kasting and Crane**, Prentice Hall, Pearson Ed. (0-321-59779-60)
- (b) Other: Calculator, Computer with spread sheet program

### 4. Course Content and Schedule

Lectures: (2) 1 hour and 20 minute blocks: Mon & Wed 11:30-12:50 in F210

Labs: F300 Thurs 9:30-12:20 (Lab forms are generally handed out in Monday lecture) (No lab week of Sept. 1, read Ch 1 in Kump instead)

The list that follows represents the intended sequence of topics in lecture, but the sequence may be altered in order to discuss events of local or international significance, e.g. rainfall, hurricanes, flooding, landslides, earthquakes, volcanic eruptions, tsunamis, as they occur during the course. The relationship of recent and current events to course topics is central to applying course content.

1. Introduction, KKC Ch. 1, p. 1 - 20
2. Systems concepts, KKC Ch. 2, p. 21 - 26
3. Feedback and equilibrium, KKC Ch. 2, p. 26 - 35
4. Electromagnetic radiation and Earth's energy balance, KKC Ch. 3, p. 36 – 56

**Term Project topic: book a discussion and approval time for your project and term paper prior to week 3: Monday September 15<sup>th</sup>.**

(All projects need system or process, not just Atmosphere, Geology, Biology or Oceanography but how one of these affects one or more of the others)

5. Atmospheric Circulation, KKC Ch. 4, p. 57-83
6. Ocean Circulation, surface currents KKC Ch. 5, p. 84 – 95  
Ocean Circulation, circulation of the deep oceans, p. 96-106
7. Structure of the solid earth, KKC Ch. 7, p. 122 – 130  
Plate Tectonics, KKC Ch. 7, p. 130 – 147 (move to Week 6 for Shake Out BC)

**Test 1 ~week 5-Thurs Sept 18 in lab period.**

8. Cryosphere, KKC Ch. 6, p. 108-121
9. Biogeochemical Cycles: The short-term carbon cycle KKC Ch. 8, p. 149 – 159;  
Long-term carbon cycle, KKC Ch. 8, p.  
Carbonate-silicate cycle, p.168-170  
P and N cycles, p. 170-173

**Term Project Written Report due in week 10 on Thurs Nov 6 at beginning of lab period.**

10. Origin of the Earth, KKC Ch. 10, p. 190-197
11. Long-term Climate, KKC Ch. 12, p. 233-253

**Test 2~week 10-Thurs Nov 6 in lab period**

12. Pleistocene Glaciation; Milankovitch Cycles KKC Ch. 11, p. 271-294
13. Global Warming, Part 1, Recent and Future Climate, KKC Ch. 15, p.295-320
14. Part 2, Impacts (Massive Extinction Events), Adaptation and Mitigation, p. 321-339
15. Ozone, KKC Ch. 17, p. 340-360  
The Future; Review

There are 14 broad lecture topics, which will each require about 1 week. We will attempt to cover all the topics thoroughly, as time permits. Bear in mind that the interrelationships amongst topics are of fundamental importance. For example, greenhouse gases affect climate and climate affects the carbon cycle, or tectonic mountain building and ocean basin development affect circulation in the atmosphere and oceans, and circulation of the

atmosphere and oceans affects climate, ecology and evolution etc.

Use the introductory chapter and a preview of the topics in the rest of the text to choose your personal project report topics. Book a time to discuss them with me and receive direction and approval prior to Tues Sept 25.

## 5. Basis of Student Assessment (Weighting)

**(a) Labs:** 10 labs, each worth 2.5% of the course for a total of 25%. Lab hand outs will be provided weekly on the Monday or Wednesday prior to Thursday's lab so you may read them and prepare before coming to the lab. Labs are done in pairs of students for help with measurements discussion of concepts and interpretations. They support important concepts such as latent heat, convection, relative humidity, geological materials and environmental records, but do not necessarily occur in the same sequence as the lectures. Label each lab assignment with your name and your partner's name. Most people learn most in the lab and pull up their course marks by handing in all of the labs. Lab marks are based on cumulative points earned so a partially complete labs is better than none at all. Labs handed in after I return them to the class will not be marked or accepted. **YOU MUST PASS THE LAB TO PASS THE COURSE.**

**(b) You must sign a waiver to attend Field Trips.** ~2 of these may occur during lab periods so do not arrive late or we may have gone off without you! 2 half day weekend **Field Trips** are to be scheduled for **Sidney: Roberts Bay & Island View Beach, East Sooke Park**, or Botanical Beach, tides permitting, and drivers and bus available. These will be announced 2 weeks in advance always on a Saturday or a Sunday to permit more time and distance. Each weekend field trip is equivalent to a lab credit so they add to your total lab score and help your mark.

**(c) Quizzes** may occur in Monday class to test assigned readings for week to come and concepts from prior week's lectures. These are marked as attendance but they are helpful for question styles & exam previews.

**(d) Exams:** Tests 1 in week 5 during lab period, and test 2 in week 10, each worth 15%; Final worth 30%. **YOU MUST PASS THE FINAL TO PASS THE COURSE.** I have a 1 test forgiveness policy for those who improve their test scores. For example, if you do better on the final exam than a prior exam, I will replace the preceding lower mark and its proportion with the mark from your final exam.

**(e) Term Project on an Earth System topic:** such as (1) an independent earth system science topic involving 2 or more processes and interactions between them, (2) critique a published research paper in a peer reviewed international geological or geophysical journal (Journal of Climatology, Journal of Geophysical Research, Quaternary Geology, Geobiology, Paleos etc.), or conduct your own original field experiment or field based observations relating 2 or more course system components (atmosphere, biosphere, geosphere and hydrosphere and report (or other approved activity)) worth 15%. For example:

- i) Are Massive Extinction Events caused by natural geological catastrophes or loss of biodiversity: evidence from the geological record?
- ii) Critique of: "Coral Reefs and Ocean Acidification" by Joan A. Kleypas and Kimberly K. Yates (2009) Oceanography Vol. 22, No.4. 108-117. Special issue feature coral reefs and ocean acidification.
- iii) Coarsening of beach sediment by longshore drift, down current from the recently stabilized cliffs West of Sunova Beach, Victoria, B.C.
- iv) Local, Regional and Global Effects of continued Tar Sands Mining and Heavy Oil Extraction.
- v) Climate drivers other than Milankovitch cycles.
- vi) Continent-Continent collisions and the dispersion of mineral dusts by jet streams and seasonal cyclonic storms.
- vii) Sensitive ecosystems: "the canary in the coal mine" for rapid climate change.
- viii) Rapid Continental Deglaciation: causes and consequences.
- ix) Climate change and the marine carbon cycle.
- x) Stable isotope records of climate recorded in cave speleothems.
- xi) Geological factors in rapid biological speciation and evolution.

Final exam at the end of the course will cover **all** course & lab material.  
You must have a passing grade in the lab portion of the course to be able to write the final exam.

I have a 1 test forgiveness policy for those who improve their test scores. For example, if you do better on the final exam than a prior exam I will replace the lower mark and its proportion with the mark from your final exam.

**Don't** make travel arrangements for the final exam period Weeks of Dec 8 and 15 until the registrar schedules exams during Mid-October. Only medical excuses will be allowed.

## 6. Grading System

(No changes are to be made to this section unless the Approved Course Description has been forwarded through the Education Council of Camosun College 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](http://camosun.ca) for 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, 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 3 <sup>rd</sup> course attempt or at the point of course completion.)
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.

## 7. 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](http://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 the College web site in the Policy Section.