



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE
FALL 2017

1. **Course:** Geology 555, Global Tectonics

Lecture Sections:

L01: Tu & Th, 12:30-13:45, ST131

For a listing of all lab sections corresponding with this course, please see the following link:

http://geoscience.ucalgary.ca/geoscience_info/courses/f17

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Office Hours: Tuesday 3-4, Wednesday 12-1, or by appointment

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2. **Prerequisites:** Geology 431 or 443 and Geology 493 or 491. See section 3.5.C in the Faculty of Science section of the online Calendar (www.ucalgary.ca/pubs/calendar/current/sc-3-5.html)

3. **Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments, Review summary (lab)	15%
Quizzes (lab)	15%
Seminar Participation (lab and lecture)	10%
Lecture Midterm test	15% (October 26 th)
Review Project (oral presentation)	10%
Review Project (Term Paper)	20%
Lecture Final Examination	15% (November 30 th)

Students need to successfully complete the lab, lecture and project components of the course to get a passing grade. Successful completion of a component means obtaining >50% in the assessment parts associated with that component.

Each piece of work (assignment, laboratory report, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

Percent and Letter Grade

95 ≤ A+

90 < A < 95.0

87 < A- ≤ 90

84 < B+ ≤ 87

80 < B ≤ 84

77 < B- ≤ 80

74 < C+ ≤ 77

70 < C ≤ 74

67 < C- ≤ 70

63 < D+ ≤ 67

57 < D ≤ 63

F ≤ 57

4. Course Organization, Objectives and Content

Course Organization

This course involves two 75-minute lectures, and one lab period (per student) each week. The lecture schedule on the last page of this outline shows what topics will be covered and when they will be covered during the term. Because some topics may not be finished in the predicted lecture time, the lecture schedule will likely be modified.

Learning Objectives

Global tectonics is an exciting, interesting, and rapidly evolving field of geosciences! Objectives for this course are for students to learn the foundational tenants of plate tectonics and what they predict of the dynamic processes that shape the Earth. The lecture schedule for this course outlines the topics that will be covered during the term. The learning goals including the knowledge and skills students are to learn in this course are summarized below.

Course Content

Concept	Understandings	Essential Questions
#1 The surface of the earth is dynamic and characterized by the growth and removal of topography	<p>Plate tectonics is the unifying theory that explains the formation, evolution, deformation, and destruction of the lithosphere.</p> <p>The theory of plate tectonics seeks to explain all geologic and geophysical observations.</p>	<p>What are the details of the theory of plate tectonics?</p> <p>What are the suite of observations that plate tectonics seeks to describe?</p> <p>Where does the theory of plate tectonics fail? What observations is it not able to describe?</p>
#2 Fundamentals of plate tectonics	<p>What is the structure of the earth and how does it lead to tectonic processes?</p> <p>Tectonic plates behave as rigid bodies that move relative to one another across the surface of the earth.</p> <p>The rigid lithosphere moves atop the weak asthenosphere. The asthenosphere marks a zone at the top of the convecting mantle</p> <p>The age, structure, thickness, and composition of continental plate differ from oceanic plates.</p> <p>The rates at which continental plates move across the surface of the earth differs from those of oceanic plates.</p>	<p>What forces drive the motions of tectonic plates?</p> <p>What factors lead to plates being conserved?</p> <p>What is the thermal, compositional, and rheological structure of the Earth and how is this known?</p> <p>What are the physical mechanisms that control the rheology of the earth?</p>
#3 Tectonic processes driving the evolution of the surface of the Earth	<p>The surface and topography of the earth is shaped by tectonic processes.</p> <p>Tectonic processes govern the distribution of natural resources globally.</p> <p>The history of the creation of oceanic crust is recorded by magnetic lineations and seismic anomalies mark the history of subduction.</p>	<p>What are the dynamics of the process by which tectonic plates form? How does the formation of a continental plate differ from that of an oceanic plate?</p> <p>What are the dynamics and consequences of the destruction of tectonic plates?</p>

<p>#4 Types of observations that lead to the refinement of the theory of plate tectonics.</p>	<p>Mountain ranges form in continental interiors with no clear driving force.</p> <p>More detailed and sophisticated geologic and geophysical observations of the structure and dynamics of the Earth have uncovered processes that the original theory of plate tectonics cannot explain.</p> <p>Seismic and geodetic observations indicate that deformation occurs well away from plate boundaries and can be broadly distributed across continental plates.</p>	<p>What is the mechanism by which forces are transferred from the boundaries of continents toward their interiors?</p> <p>What can the failings of plate tectonics teach about fundamental earth processes?</p> <p>What are the common characteristics of settings in which plate tectonics fails?</p>
<p>#5 A strong interplay exists between tectonics and climate</p>	<p>Erosive processes continue to actively remove topography created by tectonics.</p> <p>The surface of the Earth rebounds following the removal of topography by rebounding. Topography is removed when the rate of removal exceeds the rate of rebound.</p>	<p>What links the interior and exterior layers of the Earth's?</p> <p>What information can the relationships between climate and tectonics provide about tectonic forces?</p>

Skills and Knowledge

- Use of basic geoscience terminology to explain general tectonic processes
- Understand the development of the theory of plate tectonics and its subsequent refinement
- Gain familiarity with the types of observations that led to our current understanding of global tectonics
- Examine earth processes that exhibit phenomena not predicted by plate tectonics and propose mechanisms that could be responsible for these phenomena.
- Applying geologic and geophysical principles and concepts in solving tectonic problems (i.e identifying the source of tectonic forces).

Students will demonstrate their understanding of global tectonics and concepts through the course learning assessments, exams, laboratory assignments, presentations, and a term paper. A breakdown of these assessment components can be found on the first page of this course outline.

5. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.6](#) of the University Calendar

Students who are absent from the midterm exam because of illness or other unforeseen circumstances may be granted an excuse upon presentation of adequate documentation (a completed Physician/Counsellor Report form <<https://www.ucalgary.ca/registrar/files/registrar/phycoun.pdf>> for illness; equivalent documentation for other circumstances). There will be no "make-up" mid-term examination for excused absences. The weight assigned to the midterm examination will be transferred to the lecture final examination, which will be a cumulative exam for the students who were excused from writing the mid-term exam.

Similarly, students who are unable to submit laboratory reports on time because of similar excusable circumstances will be required to submit the same type of documentation to the Teaching Assistant.

6. **Course Materials:**

Required papers and readings will be posted to the class D2L site.

Recommended Textbook: Global Tectonics, 3rd Edition by Philip Kearey, Keith Klepis, Frederick J. Vine, Wiley-Blackwell; This textbook will serve as a general reference for some **but not all the topics** covered in lectures.

7. **Examination Policy:** No electronic or written aids (eg. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. Students should also read the Calendar, [Section G](#), on Examinations.

8. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Academic Misconduct:** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Academic Accommodation Policy:** Students with documentable disabilities are referred to the following links: Students with Disabilities: <http://www.ucalgary.ca/pubs/calendar/current/b-1.html> and Student Accessibility Services: <http://www.ucalgary.ca/access/>
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOI/PPA). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403-220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403-220-3913
Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403-220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI Surveys.

Department Approval: ORIGINAL SIGNED

Date: August 23, 2017