

## GEO 140: Global geophysics

**Instructor:** Gareth Funning (Associate Professor, Geophysics)  
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**Course text:** C. M. R. Fowler, *The Solid Earth* (2nd Ed.) – I recommend you buy it used from Amazon or similar (~\$65 or less).

### Timetable:

Week	Date	Topic
1	Mon Mar 30 Tue Mar 31 Thu Apr 2	Lecture 1: 'Plate tectonics' ≠ 'continental drift'   <i>Erica Emry job talk</i> Lecture 2: Plate motions and triple junctions Lecture 3: Geomagnetism
2	Mon Apr 6 Tue Apr 7 Thu Apr 9	<i>Lab 1: The Mendocino Triple Junction</i>   <i>Heather Ford job talk</i> Lecture 4: An introduction to seismic waves Lecture 5: Earthquake seismology
3	Mon Apr 13 Tue Apr 14 Thu Apr 16	<i>Lab 2: Seismic waves and earthquake locations</i> Lecture 6: Seismology and Earth structure Lecture 7: Earthquakes and society
4	Mon Apr 20 Tue Apr 21 Thu Apr 23	<i>Lab 3: Identifying faults and earthquakes</i> NO CLASS (Gareth at Seismological Society of America meeting) Lecture 8: How to see an earthquake from space
5	Mon Apr 27 Tue Apr 28 Thu Apr 30	<i>Lab 4: The phenomenology of earthquakes from InSAR data</i> Lecture 9: Gravity Lecture 10: Isostasy and flexure
6	Mon May 4 Tue May 5 Thu May 7	<i>Lab 5: Earthquake focal mechanisms</i> Lecture 11: Heat flow Lecture 12: Geotherms and plate models   Assignment 1 due at start of class
7	Mon May 11 Tue May 12 Thu May 14	<i>Lab 6: The Antarctic ice sheet</i> Lecture 13: Mantle convection MIDTERM
8	Mon May 18 Tue May 19 Thu May 21	<i>Lab 7: Geotherms and planet-o-therms</i> Lecture 14. Mid-ocean ridges Lecture 15. Subduction
9	Mon May 25 Tue May 26 Thu May 28	<i>NO LAB (Memorial Day)</i> Lecture 16: Continents and mountain belts Lecture 17: Rifts and basins   Assignment 2 due at start of class
10	Mon Jun 1 Tue Jun 2 Thu Jun 4	<i>Lab 8: Buoyancy forces</i> Lecture 18: The core and mantle Lecture 19: Forces of plate tectonics
11	Thu Jun 11	FINAL (8–11 am)

**Class times:** Discussion/Lab: Mondays 1-5 pm, Geology 1444  
(unless specified) Lecture: Tuesdays, Thursdays 11 am–12 pm, Geology 1444

**Overview:** This course introduces central concepts of solid earth geophysics as applied at the global or planetary scale. We will cover plate tectonics and dynamics of the lithosphere; seismology and earth structure; geothermal behavior and heat flow; isostasy and gravity; and geodynamics and planetary geophysics.

**Lecture materials and readings:** We will use the course text extensively. Readings will be posted on iLearn in advance of class, and the lectures will be used to clarify concepts that are covered in the readings. As an incentive, there will be a quiz on the readings before each lecture. The exams will assess both the material covered in class and the required reading; therefore it is important that you both read and *understand* the readings. I will be available at office hours and during discussion time and labs to help clarify concepts if necessary.

**Labs and discussions:** Lab and discussion time is bundled up together into a four- hour period on Monday afternoons. The portion of the time allocated to discussion will be used to clarify concepts from the lectures and readings, for quizzes and to go over homework problems and midterms. The portion of time allocated to labs will be used for paper and/or computer exercises designed to explore the material more deeply and to give students preparation for answering the kinds of problems that will be covered in homework assignments and exams.

**Assessments:** The course is assessed in the following ways:

*Exams:* The midterm and final are both timed exams. Exams are open note – you will be allowed to bring handwritten notecards with you to the exam. Past exam papers and example problem sets will be posted on the iLearn site for the course, to give you an idea of the sorts of questions that may be asked. You are encouraged to practice answering these questions and discuss them at office hours. All exams are comprehensive – that is, you could be asked about anything we have covered in the course to date.

*Labs/practical exercises:* You will receive credit for completing each practical exercise correctly. Most of these will take place during the lab time slot on Mondays, but there will also be occasional practical exercises during lecture time slots that will also fit into this category.

*Assignments:* There will be two extended homework assignments, one on earthquakes and faults, and one on planets and heat flow. Each counts for 20% of the final grade, and you will get around 10 days to complete each. No work will be accepted after the deadline without prior authorization; if you will have problems getting the work in on time, *let me know before the deadline passes*.

*Quizzes:* There will be regular online quizzes on the readings, posted in advance of the corresponding lectures – the idea is that you have an incentive to complete the readings before lecture starts, and to identify problems with understanding the material ahead of time, so that they can be addressed in the lectures. The worst five quiz scores are dropped.

**Course credit:**

40% written exams (30% for the final, 10% for the midterm).  
40% assignments (20% for each of two assignments)  
10% lab/practical exercises  
10% quizzes

The course is not curved, but the grade boundaries will be set taking into account the distribution of total scores. In past years, 70% has been the threshold for an 'A' grade, and around 50% for a passing grade, although the format of the class has been changed somewhat this year, so this may be revised. [I mention this now, since it has been a point of contention with past students; nowhere in any official university documentation does it say that an A=90%, and I wasn't brought up in a system like that...]

**Educational research project:** I am participating in a project called 'GETSI' (Geodesy Tools for Societal Issues) that is focused on creating teaching resources. In order to evaluate the effectiveness of these materials, which form part of the class, I am working with educational consultants at the Science Education Resource Center ([serc.carleton.edu](http://serc.carleton.edu)). If you agree to participate (and participation is completely voluntary, requiring your signed consent), then you will be asked to complete a few surveys, and some of your submitted work will be used to assess whether the learning and teaching goals of the teaching materials have been met. Participants' responses will not be identifiable by name to the external consultants, and no individual results will be reported, only the results from the group.

**Academic dishonesty:** There is a zero tolerance policy with respect to cheating and plagiarism. All cases of academic dishonesty will be reported to the relevant authorities.

**Expected minimum amount of study time:** You are reminded of the University of California regulations on course credits:

*Regulation 760 - Credit in Courses: "The value of a course in units shall be reckoned at the rate of one unit for three hours' work per week per item on the part of the student, or the equivalent."* This means that each credit represents three hours of expected work by the student. GEO 140 has three credits of lecture/discussion and an additional unit of lab. This means that each hour spent in lecture or discussion must be supplemented with an additional two hours of study outside of class, and each lab is expected to last for three hours.

**iLearn:** The iLearn site for the course will be populated with useful supporting materials for the course, including the lecture slides, lab handouts, additional readings, and past exam questions. If there is interest, I will also open up discussion boards and post FAQs.

**Conduct in class:** Behavior that is distracting to your fellow classmates or instructors is disrespectful and has no place in the classroom. Distracting behaviors include texting/ playing with cellphones, web surfing (except when necessary in class) and holding private conversations, although that is not an exhaustive list. Learning is best achieved in an environment in which distractions and disturbances are limited; please consider the consequences of your actions.