Geology 352—Introduction to Geophysics
MTWR, 12:00-12:50, ES 223.
Text: The Solid Earth, an Introduction to Global Geophysics, by CMR Fowler

Instructor: Jacqueline Caplan-Auerbach (please call me Jackie)
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Office hours: Monday, Wednesday, 10:00-12:00

Date	Topic	Assignment/chapter
Tuesday, 4/3	Introduction	Chapter 2
Wednesday, 4/4	Earth structure	Chapter 2
Thursday, 4/5	Introduction to MATLAB	*HW 1 due*
Monday, 4/9	Plate tectonics intro	Chapter 2
Tuesday, 4/10	Plate tectonics I	Chapter 3
Wednesday, 4/11	Plate tectonics II	*HW 2 due*
Thursday, 4/12	Earth's magnetic field and reversals	Chapter 3
Monday, 4/16	Paleomagnetism I	Chapter 3
Tuesday, 4/17	Paleomagnetism II	*HW 3 and EQ dictionaries due*
Wednesday, 4/18	Magnetism problems	Chapter 3
Thursday, 4/19	***FIRST MIDTERM EXAM***	
Monday, 4/23	Intro to earthquakes	Chapter 4
Tuesday, 4/24	Seismic waves and seismic tomography	Chapter 4
Wednesday, 4/25	EQ focal mechanisms	Chapter 4
Thursday, 4/26	Analysis of focal mechanisms and tectonics	*HW 4 due*
Monday, 4/30	Focal mechanism presentations	
Tuesday, 5/1	Refraction seismology	Chapter 4
Wednesday, 5/2	Refraction seismology	Chapter 4
Thursday, 5/3	Intro to reflection seismology	*HW 5 and EQ dictionaries due*
Monday, 5/7	Seismology problems	
Tuesday, 5/8	***SECOND MIDTERM EXAM***	
Wednesday, 5/9	Gravity—introduction and theory	Chapter 5
Thursday, 5/10	Gravity anomalies, geoid and isostasy	Chapter 5
Monday, 5/14	Gravity and isostasy	Chapter 5
Tuesday, 5/15	Isostasy problems	*HW 6 due*
Wednesday, 5/16	Intro to heat flow	Chapter 7
Thursday, 5/17	Heat flow and conductive cooling	Chapter 7
Monday, 5/21	Formation of oceanic lithosphere	Chapter 7
Tuesday, 5/22	More on oceanic lithosphere	*HW 7and EQ dictionaries due*
Wednesday, 5/23	Heat flow problems	Chapter 7
Thursday, 5/24	***THIRD MIDTERM EXAM***	
Monday, 5/28	***MEMORIAL DAY, NO CLASS***	
Tuesday, 5/29	Mid ocean ridges	Chapter 9
Wednesday, 5/30	Mid ocean ridges	Chapter 9
Thursday, 5/31	Work on plume presentations	Chapter 9
Monday, 6/4	Hot spot/mantle plume presentations	
Tuesday, 6/5	Hot spot/mantle plume presentations	
Wednesday, 6/6	Hot spot/mantle plume summary	
Thursday, 6/7	Final review!	
Tuesday, 6/12	**FINAL EXAM—8:00-10:00 a.m.**	

The syllabus may (and probably will) be revised during the quarter to address the needs and goals of the class.

Class goals: There are a number of methods that we use to determine what the Earth is like, how it has evolved, and how it behaves. Geophysics is the study of Earth processes using physics and physical techniques. In this class we will investigate a wide variety of geophysical processes, including seismology, magnetism, heat flow and

gravity. We will determine how plates move, how one can determine the fault plane for an earthquake, how one can identify a magma reservoir beneath a mid-ocean ridge and whether ocean island volcanoes are really formed by mantle plumes. We will investigate topics from a mathematical perspective as well as with more descriptive methods. Techniques emphasized in class include manipulating and solving equations, interpreting geophysical data, graphing and data presentation, and understanding how science progresses and works.

Prerequisites: Please note that this course has several prerequisites. You are expected to have taken Structural geology and Physics 121. These courses also have prerequisites, so it is also assumed that you have taken Geo 211 (or the equivalent) and Math 124 (or the equivalent). If you do not have these prerequisites, please see me right away.

Grades: Your grade in this class will be based off of a combination of homework and exam scores. Homework will be worth ~30% of your grade, with 40% based on 3 mid-term exams and 20% for the final. The remaining 10% will be split between on the "equation dictionary" project, for which there is a description posted on the class website, and the mantle plume presentations in the final week of class. I will also give some credit for in-class participation, including discussion sessions, asking questions and speaking-up when you don't understanding something.   There will be more-or-less weekly homework assignments which will be a combination of problem sets, written assignments and the reading of scientific papers. Unless you have spoken with me in advance, late assignments will be marked down 10% per day, and will not be accepted if they are over a week late. If there is a problem and you are unable to attend one of the exams *it is your responsibility to tell me in advance and work out an alternative.*

A:	>92.4%
A-:	90.0-92.4%:
B+:	87.5-89.9%
B:	82.5-87.4%
B-:	80.0-82.4%
C+:	77.5-79.9%
C:	72.5-77.5%
C-:	70.0-72.4%
D+:	67.5-69.9%
D:	62.5-67.4%
D-:	60.0-62.4%
F:	<60.0%

Assignments: In general, we'll be following the text fairly closely (and augmenting it). This means that the text is a good parallel to the class and a great source of complementary information. I have noted on the syllabus what chapter we will be discussing each day, but I'm going to leave it to you to decide when you want to read the chapter. Some people prefer to read the text in advance of lecture, while others prefer to use it as a reminder of what we did in class. I strongly recommend that you do read it, however, since it is always helpful to see material presented in multiple ways. There may also be reading assignments that are not part of the text. In those cases, if possible I will post PDF files of those assignments to Blackboard. Otherwise, I will put a copy in the Bressler room (the small conference room next to the Geology department office), and you can either read the assignment there or Xerox it.

You are *required to show your work on all problem sets.* In general, I care much less that you get the right answer than that you go through the correct process to get there. You will be graded on your methodology first, followed by the reasonableness (if that's a word) of your answer. For example, if you are asked to calculate the velocity of a tectonic plate, understand the formalism but accidentally hit the wrong number on your calculator and get 5 cm/yr rather than 2 cm/yr, you will not be graded down. If, however, you get an answer that it unreasonable, such as 2 m/s, you will lose points for not recognizing that this answer is obviously incorrect. I'm exceptionally fussy about units, so you'll want to make sure that you always include units on your answers (a plate can't move at a speed of "2"—we need to know if it's 2 cm/yr or 2 mph). And finally, you need to put the proper number of significant digits on your answers. Your answer can only be as precise as your least precise measurement, so even if your calculator tells you the answer out to 8 decimal places, unless your input data had that same level of precision, those numbers are meaningless. If you don't understand significant digits and how to determine how many significant digits to use, please see me or read a great summary here: http://www.physics.uoguelph.ca/tutorials/sig_fig/SIG_dig.htm

MATLAB: Some of the problem sets assigned in this class will make use of the mathematical software MATLAB. MATLAB is an immensely powerful program that allows you to analyze and plot quantitative data. Because most, if not all of you are new to MATLAB, we will include an introduction to the software and I will post a tutorial on Blackboard. I'll also provide some MATLAB scripts for some of the problems and will be happy to help guide you in the use of the software.

Academic honesty: You are responsible for knowing the university policies on Academic honesty and plagiarism which may be found at http://www.library.wwu.edu/ref/plagiarism.html. I will expect that you understand what plagiarism is, and how to avoid it, but if you have any questions, please ask me rather than risk accidentally committing an act of academic dishonesty. Please also note that unless it is explicitly stated in an assignment, you are expected to do all of your work yourself. This means that although you and a friend may discuss the assignment, you must write them up completely separately. *Again*, *see me if this is not clear*.

Office hours and contact: Please do not hesitate to contact me during my office hours or by appointment if those hours do not work with your schedule. You may also email me at the address shown above. I am very flexible with meeting times, so if my office hours don't fit with your schedule, I promise that we will find a way to meet if need be. If there is a problem and you are unable to attend one of the exams, *it is your responsibility to tell me in advance and work out an alternative.*

Academic success and support services: Please feel free to talk to me anytime about your performance in the course or possible ways you can improve it. Academic support services are also available if you need them. Tutors are available for a fee through the Tutorial and Academic Skills Center (TASC) at 650-3855 or http://www.wwu.edu/depts/tutorialcenter/home.htm . If you need disability-related accommodations, please notify Student Support Services at 650-3083 (phone) or 650-3725 (TTY) or http://www.wwu.edu/depts/drs/

Attendance, tardiness, leaving early: Attendance is not mandatory and you will not be marked down for any absences but please understand that in order to get the most

out of this class you need to be in class taking notes. If you cannot attend a class, please get notes from your classmates. I'll be happy to answer any questions you have about the notes but I will not supply you with my own. Nor will I review what you missed unless you get a classmates' notes first.

Regarding cell phones…under NO circumstances should a cell phone or pager ring or ever be answered in class. If you are waiting for an important call, please let me know, but recognize that I may ask you to wait for your call outside. If there is a circumstance that requires you to be in cell phone or pager contact (if, for example, you moonlight as an EMT or you're awaiting the birth of your first child), please discuss this with me in advance of class. If your cell phone rings in class, you will be asked to leave. If you answer your phone in class you will be asked to leave and not return.