
GEL 162: Geophysics of the Solid Earth

Fall 2018

MWF 1:10-2:00 PM, EPS 1316

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Office Hours: Tues 1-2 (Moores Room/EPS 1119)

Textbook: The Solid Earth by CMR (Mary) Fowler, 2nd edition. Cambridge University Press, 2005

What this class is about: This course provides an overview of geophysics, the application of physics to all aspects of Earth Science. We will try to understand what can be learned about the structure and dynamics of Earth's interior from constraints including topography, gravity, the magnetic field, rock magnetism, radioactive decay, and seismic waves. We will also devote some time to the comparison of Earth to the other terrestrial planets and icy bodies in our solar system.

Prerequisites: A working knowledge of introductory physics and calculus, and the desire to understand the state and evolution of the solid Earth.

Grading: There will be problem sets distributed each Wednesday and due the following Wednesday at the start of lecture. If you cannot attend lecture, your assignment must be submitted to the dropbox near the elevators in the EPS building before the start of lecture. Graded problem sets will be returned the following Monday. Your final grade will be determined based on:

50% Homework and quizzes

20% Midterm exam

30% Final exam

Course Policies: No late work will be accepted unless approval is granted at least 24 hours in advance of the due date, except under extenuating circumstances such as a family or medical emergency.

Academic Honesty: Academic integrity is essential to the scientific enterprise. You may work together on homework assignments, but the final work that you turn in must be your own (i.e. not identical to that of your classmates). It is a violation of the University's standards for academic conduct to give or receive aid on any examination. Student conduct violations will be referred to UC Davis Student Judicial Affairs.

Detailed Schedule of Topics and Events (Subject to revision)

Week	Date	Topic	Reading	Due Dates
0	9/26	Overview of global geophysical observations	Ch 1 (Introduction)	
	9/28	Plate motions and rotations		
1	10/1	Plate boundaries and triple junctions	Ch 2	
	10/3	Earth's Magnetic Field		HW1 Due
	10/5	Magnetic anomalies and plate reconstructions		
2	10/8	Radioactivity and geochronology	Ch 6 (focus on 6.1-6.2)	
	10/10	Gravity and the geoid	5.1-5.4	HW2 Due
	10/12	Airy and Pratt models for isostasy	5.5-5.6	
3	10/15	Stress and strain	Appendix 2	
	10/17	Elasticity	T&S 3.9-3.18	HW3 Due
	10/19	Flexure and plate bending	5.7	
4	10/22	Wave propagation through Earth's Interior	4.1	
	10/24	Global Seismology and 1D structure	4.3-4.4	HW4 Due
	10/26	Mantle tomography + <i>Paper discussion</i>	French and Romanowicz 2015	
5	10/29	Earthquake sources	4.2	
	10/31	Moment tensors		HW5 Due*
	11/2	(EXAM) Midterm Exam		
6	11/5	Conduction of heat in solids	7.1-7.3	
	11/7	Heat flow in the oceanic and continental crust	7.4	HW6 Due
	11/9	Periodic changes in temperature	7.4	
7	11/12	No class - Veterans Day Observed		
	11/14	Fundamentals of fluid flow	8.1	HW7 Due
	11/16	Onset of convection	8.2	
8	11/19	Convective heat transport		
	11/21	Phenomenology of convection	8.3	HW8 Due
	11/23	The mantle geotherm	7.7	
9	11/26	Forces that drive plate motions Convection around the solar system		
	11/28	+ <i>Paper discussion</i>	Paper (TBD)	HW9 Due
	11/30	No class - Thanksgiving		
10	12/3	Flow in porous media	T&S Ch 9	
	12/5	Geothermal systems		HW10 Due
	12/7	Special topic (TBD)	(by student input/request)	
	12/12,			
Final	8 AM	Final Exam		

*HW5 will consist of exam prep questions

