

Plate Tectonics – GEOL 443/643 – Spring 2019
Room CBCC-224 – M-W 2:30 – 3:45 pm

Instructors: Michael Wells
Office Hours: T-R, 10:00-11:30 pm, or by appointment
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Required Text: *Global Tectonics* by Philip Kearey, Keith Klepeis, and Frederick J. Vine
Supplementary Text: *Plate Tectonics* by Allan Cox and Robert Brian Hart (on reserve and handouts)
Tectonics by Eldridge M. Moores and Robert J. Twiss (on reserve)

Purpose of this Course

This course is designed as a study of the internal dynamics and structure of Earth. Emphasis is on the mechanisms and geometric constraints of plate motion, tectonic processes of plate boundary zones, and the physical, thermal and chemical interactions of the Earth's compositional shells.

Learning Outcomes –

Upon completion of this course, students will be able to:

1. Describe the internal structure and composition of the Earth and understand the observational data sets in support of this and the uncertainties
2. Describe the major types of plate boundaries, and understand the geophysical and geologic observations that delineate them
3. Describe the forces driving plate motions, the factors that strengthen or diminish these forces, and understand the observational data sets used in their study
4. Understand the kinematics of plate motions on a spherical Earth, and the observations used to constrain both long-term (geologic) and short-term plate motions
5. Evaluate, synthesize, and predict geologic processes and the resulting geologic record associated with different types of plate boundaries
6. Understand, evaluate and discuss selected current research publications on current topics in plate tectonics
7. Analyze diverse geologic and geophysical data sets to solve large-scale geologic problems, recognizing inconsistencies and ambiguities in interpretations of data

Grading:	Undergrad	Graduate
Homework	15%	15%
Midterm Exam	35%	30%
Class Participation	10%	10%
Final exam	40%	35%
Presentation	NA	10%

Material for the both exams will focus on lecture, textbook and article readings, and discussion topics covered since the previous exam. The final will be comprehensive, but will focus on the last ½ of the material. This syllabus is subject to change.

Succeeding!

The textbook, Global Tectonics, is required for the course. Reading assignments for the lecture are listed by date on the accompanying course outline. In addition to the principal

textbook, there will be readings from the supplementary textbooks and articles to be assigned. Please read the appropriate assignments before coming to the lecture. Material will be presented in lecture that is not covered in the textbook, so don't miss class! To promote interactive learning, class participation is not only strongly encouraged but also required.

Logistics and Policies

1. Participation:

You are expected to be an active participant in the course and much class activity will involve group discussions. Throughout the semester we will have various guest speakers who will expect questions and discussion from you as an audience.

2. Attendance

Class attendance is required.

3. Academic Misconduct – Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

An example of academic misconduct is plagiarism: "Using the words or ideas of another, from the Internet or any source, without proper citation of the sources." See the "Student Academic Misconduct Policy" (approved December 9, 2005) located at:

<http://studentlife.unlv.edu/judicial/misconductPolicy.html>.

3. Copyright Issues

The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. **YOU ARE INDIVIDUALLY AND SOLELY RESPONSIBLE FOR VIOLATIONS OF COPYRIGHT AND FAIR USE LAWS. THE UNIVERSITY WILL NEITHER PROTECT YOU NOR DEFEND YOU NOR ASSUME RESPONSIBILITY FOR EMPLOYEE OR STUDENT VIOLATIONS AND FAIR USE LAWS.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/committees/copyright>.

4. Disability Resource Center (DRC)

The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you.

If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor before or after class to discuss your accommodation needs.

5. UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be

made in person or by calling 895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

6. Religious Holidays Policy – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the end of the first two weeks of classes, January 30, 2015, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

7. Official Extracurricular Activity

All students who represent UNLV at an official extracurricular activity shall have the opportunity to make up assignments, but you must provide official written notification to me no less than one week prior to the missed class(es).

8. Learning Environment

The classroom is intended to be a place of learning. As such and as specified in the UNLV Undergraduate and Graduate Catalogs, no pagers, cell phones, or other potentially disruptive devices are allowed in either lecture or the laboratory.

TENTATIVE CLASS SCHEDULE

Wk	Date	Lecture Topic	Reading Assignment*
1	Jan. 23	Introduction of Plate Tectonics – Seismology	Ch. 1, 2.1
2	Jan. 30	Earthquake Seismology – Velocity Structure of Earth	2.1-2.2; C&H6; HW1
	Jan. 29	Earth's Composition	2.3-2.9
3	Feb. 4	Lithospheric Deformation I	2.10
	Feb. 6	Lithospheric Deformation II	2.10
4	Feb. 11	Isostasy, Flexure, and Gravity	2.11-2.12
	Feb. 13	Heat Flow	2.13
5	Feb. 18	Presidents Day Holiday	
	Feb. 20	Driving Mechanism of Plate Tectonics	Ch. 12; C&H10
6	Feb. 25	Mantle convection	Ch. 12
	Feb. 27	Mantle convection	Ch. 12
7	Mar. 4	Paleomagnetism and Apparent Polar Wander Paths	3.6; C&H8
	Mar. 6	Sea Floor Magnetic Anomalies and Seafloor Spreading	4.1; C&H8; HW2
8	Mar. 11	Kinematic Framework, 2-D Plate Motions	Ch. 5; C&H1
	Mar. 13	Mid Term Exam	
	Mar. 18- Mar. 22	Spring Break	
9	Mar. 25	Triple Junctions, Velocity Triangles	Ch. 5; C&H2; HW3
	Mar. 27	Plate Motions of a Sphere	Ch. 5; C&H4
10	April 1	Modeling and Measuring Relative and Absolute Plate Motions	5.4, 5.5, 5.8; C&H4
	Apr. 3	Oceanic Ridges	Ch. 6
11	Apr. 8	Oceanic Transform faults and Fracture Zones	4.2, 6.12
	Apr. 10	Continental Transform Faults	Ch. 8
12	Apr. 15	Continental Rifts - Generalities	Ch. 7
	Apr. 17	Continental Rifts – Basin and Range	Ch. 7
13	Apr. 22	Subduction Zones	Ch. 9
	Apr. 24	Andean-type Mountain belts	10.1-10.3
14	Apr. 29	Collisional Mountain belts	10.4-10.6
	May 1	Special Topics Presentations (Grad only)	
15	May 6	Special Topics Presentations (Grad only)	
	May 8	Special Topics Presentations (Grad only)	
16	May 15	Final Exam 3:10-5:10	

*Ch. 6, 5.9: reading in Kearey, Klepeis and Vine; C&H10: reading in Cox and Hart