

UNIVERSITY OF TEXAS AT EL PASO  
Department of Earth, Environmental and Resource Sciences

**GEOLOGY 4315/5361/6361: Plate Tectonics**  
**Fall 2023**

*Instructor:* **Dr. Jay Chapman**, Geology Room 319, jchapmanv@utep.edu  
Office hours: 8:00-9:00 am Tuesday and Thursday (or by appointment)

*Class Meetings:* **Lecture:** Monday and Wednesday 10:30-11:50am in Geology 302

*Overview:* The application of geological and geophysical data to the description and evolution of motion between the lithospheric plates. Topics include: relative velocities between plates, triple junctions, plate rotations, seismicity and plate boundaries, marine magnetic anomalies, paleomagnetism, plate driving mechanisms, relationship of plate tectonic processes to geologic evolution and features

*Class Objectives:* Develop a thorough background in the basic geophysical and geologic characteristics of plate boundaries. Emphasis is on tectonic processes and implication of plate boundary processes to development of geologic systems. By the end of this class students should be able to:

- Understand and apply the concepts of relative plate motion on planes and spheres
- Use seismicity and focal mechanisms to analyze active fault kinematics and their relationships to plate boundary processes
- Understand how different data sets are used to analyze both present day and past plate motions
- Recognize the different definitions of lithosphere vs asthenosphere and the importance of variations in these characterizations of the system
- Understand the distinctive rock and structural associations that characterize different plate boundaries
- Be able to use lithologic and structural associations to synthesize geologic and geophysical data into a coherent tectonic history of ancient plate margins
- Analyze diverse geologic and geophysical data sets to solve large-scale problems, recognizing inconsistencies and ambiguities in interpretations of data

*Prerequisites:* graduate standing or instructor approval. Please talk to the instructor if you are uncertain about the course. In general, undergraduate students should have course work equivalent to a senior geology major. Students should be comfortable with intro-level physics and have had an introduction to calculus. If you don't have this background, it is not a problem, but you may need to work harder than some other students.

*Undergraduate vs Graduate Student Assessment:* There are higher expectations for assignments submitted by graduate students compared to undergraduates due to the difference in experience and available time. Assignments and exams will be assessed with a different scale and may be set up differently.

Textbook: There is no required textbook to purchase. Supplementary readings will be provided by pdf. Optional textbooks include:

- 1) “Global Tectonics” by Kearey, P., Klepeis, K., and Vine, F.J., 2008, 3<sup>rd</sup> Ed., Wiley-Blackwell, 282p.
- 2) “Plate Tectonics: How it works” by Cox and Hart, 1986

**Grading:**

35%	Assignments/Homework
10%	1 <sup>st</sup> exam
15%	2 <sup>nd</sup> exam
15%	Final exam
25%	Final Project

Late assignments: Contact the instructor ahead of time. In general, late assignments will be accepted, but will have points taken off depending on how late they are turned in.

Course Communication: How we will stay in contact with each other:

In addition to class meetings and office hours, there are a number of ways we can keep the communication channels open:

- **Email:** UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt.
- **Announcements:** Check the Blackboard announcements and your email frequently for any updates, deadlines, or other important messages.

Accommodations Policy: UTEP is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS) (<https://www.utep.edu/student-affairs/cass/ada-policies/accommodations-for-individuals-with-disabilities%20.html>) Note that the student is responsible for following up with the instructors about any accommodation letters and instructions. The Center for Accommodations and Support Services can be contacted by phone (915-747-5148), email ([cass@utep.edu](mailto:cass@utep.edu)), or through their online CASS portal.

*Academic Dishonesty Policies:* Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures (HOOP). It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as one's own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. The University guidelines for academic dishonesty are very specific and will be strictly followed. All suspected violations of academic integrity must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) (<https://www.utep.edu/student-affairs/osccr/>) for possible disciplinary action. Refer to the UTEP HOOP (<https://www.utep.edu/hoop/section-2/student-conduct-and-discipline.html>), and the guidelines here (see <https://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html>) for more information, and contact the Dean of Students or the instructors if you have any concerns.

Note that this course may require you to work in groups at times and individually at other times. Although reasonable collaboration will occur from time-to-time (on assignments, not exams), all work you turn in for a grade in is expected to be your own.

**Schedule** (subject to change)

<b>Week</b>	<b>Day</b>	<b>Topic</b>
1	Aug 28 (M) Aug 30 (W)	Introduction & Historical Perspective Earth Composition: Geophys
2	Sept 4 (M) Sept 6 (W)	<b>Labor Day, no classes</b> Earth Composition: Geochem
3	Sept 11 (M) Sept 13 (W)	Plate Rheology MATLAB: Lithospheric Strength Profile
4	Sept 18 (M) Sept 20 (W)	Isostacy Flexure
5	Sept 25 (M) Sept 27 (W)	MATLAB: Flexure <b>Exam 1</b>
6	Oct 2 (M) Oct 4 (W)	Plate Motions 1,2 Plate Motions 3
7	Oct 9 (M) Oct 11 (W)	<b>no class</b> <b>no class</b>
8	Oct 16 (M) Oct 18 (W)	Narrow Rifts, Wide Rifts Strike Slip Faults
9	Oct 23 (M) Oct 25 (W)	Subduction Zones 1 <b>no class</b>
10	Oct 30 (M) Nov 1 (W)	Subduction Zones 2 Slab Roll-back
11	Nov 6 (M) Nov 8 (W)	Subduction Zones 3 <b>Exam 2</b>
12	Nov 13 (M) Nov 15 (W)	Mediterranean orogens Cordilleran Orogens 1, 2
13	Nov 20 (M) Nov 22 (W)	Cordilleran Orogens 3 Collisional Orogens 1
14	Nov 27 (M) Nov 29 (W)	Collisional Orogens 2 Class Presentations
15	Dec 4 (M) Dec 6 (W)	Class Presentations Class Presentations
	Dec. 15 (F)	<b>Final Exam (subject to change)</b>