

Seismology - Fall 2020

**Geological Sciences
Univ. of Texas at El Paso**

GEOL 4315 • GEOP 5354

**Instructor: Aaron A. Velasco
Office: 227B, 101 Geological Sciences
CRN: 18297/16351**

**Tu.-Th., 9:00 - 10:00 pm, Blackboard
Collaborate
Office Hours/Guest Speakers: Tu.-Th.,
10:00 - 10:30
E-mail: aavelasco@utep.edu**

Course Goals and Objectives:

The main goals of the course are to prepare students of seismology for further study of earthquakes and earth structure using seismograms and to provide an overview of earthquake seismology for non-seismologists. An additional purpose of this course is to introduce students to the frameworks, concepts, and ideas of seismic investigation, especially reading journal articles and writing, plus learn problem-solving skills and become aware of the recent issues in the field. We will review many classic observational problems and review the character and interpretation of seismograms. Since much of what we know about earthquakes is empirical or at least semi-empirical, we will also review earthquake statistics and seismotectonics, plus introductory mathematical seismology (stress-strain, reflection coefficients, ray theory, earthquake location, etc.)

Textbooks:

Foundations of Modern Global Seismology Ammon, Velasco, Lay, and Wallace
(excerpts)

Other resources

**An Introduction to Seismology,
Earthquakes and Earth Structure**

Introduction to Seismology Stein and Wysession

The Elements of Style Shearer

Strunk and White

Grades and Grading:

Grades will be calculated on the basis of homework assignments (computer-based and analytical), one mid-term exam, a term paper and presentation, a final exam, and participation. Homework assignments will account for 50% of the grade, a short mid-term exam 10%, a short

term paper 15% (due Thurs., Apr. 19), a presentation of the paper 5%, a final exam 10%, and participation 10%.

Grading on written assignments will be dependent on the level of student: Undergraduates, Masters, and Ph.D. For example, Ph.D. students will be expected to absorb and extend key concepts taught in the class in their term papers. Furthermore, a guest technical writer will review at least two of your summaries for style and grammar to provide writing feedback.

Participation: For this online course, students will be required to participate in group activities during lecture, with some possible weekly discussion boards assignments. Students will also have a collection of smaller assignments throughout the week that will work to build toward the larger projects. Each of these activities will be given point values that add up toward the participation grade. These points cannot be made up, so students are expected to stay active in the course.

Homework:

Problem Sets

You will be assigned problem sets in class (approximately one per two weeks). The problem sets are due one week after they are assigned and will be due on Tuesdays at 12 pm. Turn in all assignments on Blackboard.

One-Page Summaries

You will be expected to review one recent (2014-2020) seismological journal article a week, and provide me with a one page (or less) summary, due on Thursday of every week (first one is due Thurs. Sep. 3). I may provide several of the references, but the other assignments will be based on your own interests. **Use this as an opportunity to jump start your Papers/Projects!** The summaries must be in your own words (no copying of the abstract; attach a copy of the front page of the article to your summary). The journals should be from a variety of sources and must be on some seismology topic. The university has subscriptions to most of these journals, and many can be accessed electronically.

Masters and Ph.D. Students: Draw articles from Bulletin of the Seismological Society of America (BSSA), Journal of Geophysical Research (JGR), Geophysical Research Letters (GRL), Seismological Research Letters (SRL), Geophysical Journal International (GJI), Geochemistry, Geophysics, Geosystems (G³), Earth and Planetary Science Letters (EPSL), Science, or Nature. You must receive prior approval to include other journals.

Undergraduates Students: Please draw articles from Geotimes, GSA Today, Scientific America, New Scientist, or any of the above. You must receive prior approval to include other journals.

The following information is required in your two-paragraph summary:

1. Header Information: Title, Journal, Author(s), your name
2. First Paragraph: Article Emphasis

- What: State the article topic.
 - Why: State why the topic is an important problem to study.
 - Key Assumptions: Specify the key assumptions in the article.
 - How: Outline the authors' approach to the problem.
3. Second Paragraph - Reviewer Comments
- Analysis and Results: Describe the analysis and results and assess if the results are valid and thorough. If so, why? If not, why not?
 - Discussion: Are the new results placed in proper context to other results from other research? What are the implications of the new results?
 - Conclusions: Do their results support their conclusion(s)? If not, why not? If so, please state what made the evidence compelling.

This exercise is intended to: 1) expose you to the latest issues that are being addressed in seismology and the breadth of those problems, 2) give you a head start on the term paper, and 3) get you into a good habit of reading the literature, which is key to staying on top of current issues in the sciences.

Exams:

The exams will be based on the homework and the textbook. The first exam will be on Thurs. **Oct. 8, 2020**. I will open the exam for a full 24 hours (beginning at 8:00 AM), and it will be open notes/book. It will be on Blackboard. The final is scheduled for **Tues. Dec. 8, 2020** (beginning at 8:00 AM). The exam will also be open book/notes and will be open for 24 hours.

The Term Paper/Project

The term paper/project should be a concise but thorough review of some aspect of earthquake seismology (preferably inspired from your reading), and may be aligned with your current research. Example topics include a review of a topic not covered extensively in the course, or the documentation of the theory behind and development of a set of MATLAB scripts to perform a seismic computation. You can do your own research to supplement existing studies. The work must include references and illustrations; however, reference lists, illustrations, and MATLAB script listings do not count towards the page total. References should be cited throughout the text and bibliographies should be in a standard format such as that used by either the Journal of Geophysical Research or the Bulletin of the Seismological Society of America. Your writing throughout the paper must be original, not copied from other works. Plagiarizing material will result in a non-negotiable zero on the paper.

Because of the current situation, I am going to ask that each undergraduate team with a graduate student. I would like these teams to work together, and that the graduate student assist with the understanding of the chosen topic. Turn in one paper. Papers must be 8–15 pages long (of text; double spaced). You must have at least 10 references. To ensure there each person is contributing, you must turn in a **workplan**, outlining the chosen topic and the responsibilities for each. *The workplan is due before Oct. 1. Papers/projects are due Nov. 24.* Begin work early or you will have a difficult time completing the quality of paper that you want. You should discuss any topics selected with me before you begin a large project that will consume all of your time (& more). Periodically discuss your progress on the paper with me as the semester progresses.

All of the summaries and your term paper should be submitted to SafeAssign, a plagiarism detecting software. SafeAssign is used to review assignment submissions for originality and will help you learn how to properly attribute sources rather than paraphrase. This is intended to be a good tool for you to make sure your writing is original.

Technology Requirements

Course content is delivered via the Internet through the Blackboard learning management system. Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have access to a computer/laptop, scanner ability (taking pictures works in many cases), a webcam, and a microphone. You will need to download or update the following software: Microsoft Office, Adobe Acrobat Reader, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course.

If you do not have a word-processing software, you can download Word and other Microsoft Office programs (including Excel, PowerPoint, Outlook and more) for free via UTEP's Microsoft Office Portal. Click the following link for more information about [Microsoft Office 365](#) and follow the instructions.

IMPORTANT: If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP [Help Desk](#) as they are trained specifically in assisting with technological needs of students.

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

Because this is an online class, we will not see each other in the ways you may be accustomed to: during class time, small group meetings, and office hours. However, there are a number of ways we can keep the communication channels open:

- **Office Hours:** We will not be able to meet on campus, but I will still have office hours for your questions and comments about the course. My office hours will be held on Blackboard Collaborate right after lecture (Tues/Thurs: 1-2 p.m. Mountain Time)
- **Email:** UTEP e-mail is good way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt.
- **Discussion Board:** If you have a question that you believe other students may also have, please post it in the Help Board of the discussion boards inside of Blackboard. Please respond to other students' questions if you have a helpful response.
- **Announcements:** Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

Netiquette (Internet Etiquette)

As we know, sometimes communication online can be challenging. Miscommunication can easily occur. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action.

- **Always consider audience.** This is a college-level course; therefore, all communication should reflect polite consideration of other's ideas.
- **Respect and courtesy must be provided to classmates and to the instructor at all times.** No harassment or inappropriate postings will be tolerated.
- **When reacting to someone else's message, address the ideas, not the person.** Post only what anyone would comfortably state in a face-to-face situation.
- **Blackboard is not a public internet venue; all postings to it should be considered private and confidential.** Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

Attendance and participation

Attendance in the course is determined by participation in lecture and all learning activities of the course. Your participation in the course is important not only for your learning and success but also to create a community of learners. Participation is determined by completion of the following activities:

- Reading/Viewing all course materials to ensure understanding of assignment requirements
- Completion of assignments on time
- Participating in engaging discussion with your peers in breakout sessions and on the discussion boards
- Participating in scheduled Blackboard Collaborate sessions
- Other activities as indicated in the weekly modules
- Because these activities are designed to contribute to your learning each week, they cannot be made up after their due date has passed.

Excused absences and/or course drop policy

According to UTEP Curriculum and Classroom Policies, "When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class with a grade of "W" before the course drop deadline and with a grade of "F" after the course drop deadline." See academic regulations in the UTEP Undergraduate Catalog for a list of excuse absences. Therefore, if I find that, due to non-performance in the course, you are at risk of failing, I reserve the right to drop you from the course. If you feel that you are unable to complete the course successfully, please let me know and then contact the Registrar's Office to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

Blackboard collaborate sessions

This class requires that you participate in scheduled Blackboard Collaborate sessions. The purpose of these sessions is for you to view live lectures, demonstrations of the course material, and/or to participate in small discussion groups with your classmates. These sessions will be held from 9:00-10:00 AM Tues/Thurs. Between 10:00-10:20 AM, I will have either a guest speaker discussion how they use seismology in their work, or have office hours.

Students are expected to participate in these sessions with a webcam and microphone. The sessions will be recorded and provided so that they can be reviewed by classmates at a later time. Students should not record the sessions and post them to any sites outside of Blackboard.

If you are unable to attend a Collaborate session, please let me know as soon as possible so that accommodations can be made when appropriate.

Deadlines, late work, and absence policy

All deadlines are posted on BlackBoard. The weekly summaries are due at 12:00 PM the day they are due. No late work will be accepted if the reason is not considered excusable.

Make-up work

Make-up work will be given *only* in the case of a *documented* emergency. Note that make-up work may be in a different format than the original work, may require more intensive preparation, and may be graded with penalty points. If you miss an assignment and the reason is not considered excusable, you will receive a zero. It is therefore important to reach out to me—in advance if at all possible—and explain with proper documentation why you missed a given course requirement. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

Alternative means of submitting work in case of technical issues

One thing is certain this semester: technology will fail. I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue with the course website, network, and/or your computer. I also suggest you save all your work in a separate Word document as a back-up. This way, you will have evidence that you completed the work and will not lose credit. If you are experiencing difficulties submitting your work through the course website, please contact the UTEP Help Desk. You can email me your back-up document as a last resort.

Incomplete grade policy

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

Accommodations policy

The University 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 \(CASS\)](#). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the [CASS portal](#).

COVID-19 Accommodations

Students are not permitted on campus when they have a positive COVID-19 test, exposure or symptoms. If you are not permitted on campus, you should contact me as soon as possible so we can arrange necessary and appropriate accommodations.

Scholastic integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. 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 ones' 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. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#).

Class recordings

The use of recordings will enable you to have access to class lectures, group discussions, and so on in the event you miss a synchronous or in-person class meeting due to illness or other extenuating circumstance. Our use of such technology is governed by the Federal Educational Rights and Privacy Act (FERPA) and UTEP's acceptable-use policy. A recording of class sessions will be kept and stored by UTEP, in accordance with FERPA and UTEP policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. **You may not share recordings outside of this course.** Doing so may result in disciplinary action.

Copyright statement for course materials

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

COVID-19 Precautions

You must STAY AT HOME and REPORT if you (1) have been diagnosed with COVID-19, (2) are experiencing COVID-19 symptoms, or (3) have had recent contact with a person who has received a positive coronavirus test. Reports should be made at screening.utep.edu. If you know of anyone who should report any of these three criteria, you should encourage them to report. If the individual cannot report, you can report on their behalf by sending an email to COVIDaction@utep.edu.

For each day that you attend campus—for any reason—you must complete the questions on the UTEP screening website (screening.utep.edu) prior to arriving on campus. The website will verify if you are permitted to come to campus. Under no circumstances should anyone come to class when feeling ill or exhibiting any of the known COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. Students are advised to minimize the number of encounters with others to avoid infection. Wear face coverings when in common areas of campus or when others are present. You must wear a face covering over your nose and mouth at all times in this class. If you choose not to wear a face covering, you may not enter the classroom. If you remove your face covering, you will be asked to put it on or leave the classroom. Students who refuse to wear a face covering and follow preventive COVID-19 guidelines will be dismissed from the class and will be subject to disciplinary action according to Section 1.2.3 Health and Safety and Section 1.2.2.5 Disruptions in the UTEP Handbook of Operating Procedures.

Course Resources: Where you can go for assistance

UTEP provides a variety of student services and support:

Technology Resources

- **Help Desk:** Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.
- **Department Computing:** You can contact me and/or Carlos Montana (montana@utep.edu)

Academic Resources

- **UTEP Library:** Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- **University Writing Center (UWC):** Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.

- [Math Tutoring Center \(MaRCS\)](#): Ask a tutor for help and explore other available math resources.
- [History Tutoring Center \(HTC\)](#): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

Individual Resources

- [Military Student Success Center](#): Assists personnel in any branch of service to reach their educational goals.
- [Center for Accommodations and Support Services](#): Assists students with ADA-related accommodations for coursework, housing, and internships.
- [Counseling and Psychological Services](#): Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

Table 1: Planned Topics for Seismology and Schedule

Topics	Week/Deadline	Reading
Observational Seismology		
1. Getting Started	1	Ch. 1
2. Introduction to Seismology	1-2	Ch. 1
3. Faulting	3-4	Ch. 2
4. Plate Tectonics and Earthquakes	5	Ch. 3
5. Seismic Instruments	6-7	Ch 4
6. Seismograms	8-9	Ch 5
7. Location	10	Ch. 6
8. Magnitude and Statistics	11	Ch. 7
9. Tsunamis	12	Ch. 8
10. Earthquake Prediction	13	Ch. 9
11. Earth Structure	14	Ch. 10
Deadlines		
Summaries	Thurs., 12 pm (when assigned)	
Homework	Tues., 12 pm (when assigned)	
Papers/Projects Workplan	Oct. 1	
Exam 1	Oct. 8	
Papers/Projects	Nov. 24	
Final	Dec. 8	