Seismology Syllabus - Spring 2015

Geological Sciences
Univ. of Texas at El Paso

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GEOL 4315 • GEOP 5356

Tu.-Th., 9:00 - 10:20 pm, rm. 302
Office Hours: By appointment
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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, 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:

An Introduction to Seismology,
Earthquakes and Earth Structure

Stein and Wysession

Lay and Wallace

Lay and Wallace

Shearer

Introduction to Seismology

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), a mid-term exam, a term paper, and a final exam. Homework assignments will
account for 50% of the grade, a mid-term exam 15%, a short term paper 15% (due Thurs., Nov.
21), a presentation of the paper 5%, and a final exam 15%.
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.

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.

One-Page Summaries
You will be expected to review one recent (2010-2015) seismological journal article a week, and provide me with a one page (or less) summary, due on Thursday of every week before class. I will provide several of the references, but the other assignments will be based on your own interests. 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, of which, I have many in my office, and must be on some seismology topic.


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 whether the analysis was 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 Tues March 19, 2015 during the lecture time. The final is scheduled for May 12, 2015 from 10AM – 12:45PM.

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.

Undergraduates: Papers must be 5-10 pages long (of text; double spaced). You must have at least 5 references.
Masters and Ph.D. Students: Papers must be 8–15 pages long (of text; double spaced). You must have at least 10 references.

An outline of the “probable contents” of your paper is due before Spring Break (March 5).
Papers are due April 30. 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.

Note from College of Science of Dean’s Office on Incomplete
All grades of Incomplete must be accompanied by an Incomplete Contract that has been signed by the instructor of record, student, departmental chair, and the dean. Although UTEP will allow a maximum of one year to complete this contract, the College of Science requests it be limited to one month based upon completion data. A grade of Incomplete is only used in extraordinary circumstances confined to a limited event such as a missed exam, project, or lab. If the student has missed a significant amount of work (e.g. multiple assignments or tasks), a grade of Incomplete is not appropriate or warranted.
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