Michigan Tech

GE4560 – Earthquake Seismology and GE5560 – Advanced Earthquake Seismology
Course Syllabus
Fall 2018

Instructor Information

Instructor:	Greg Waite, Associate Professor
Office Location:	428 Dow
Telephone:	Office – (906) 487-3554
E-mail:	gpwaite@mtu.edu
Office Hours:	MW 10:00 am – 12:00 pm or by appointment

Course Identification

Course Number:	GE4560 or GE5560
Course Name:	Earthquake Seismology
Course Location:	Dow 610 or Dow 709
Class Times:	MWF 2:05pm – 2:55pm
Prerequisites:	GE3000/GE3050(Structural Geology); PH2100 (classical mechanics) MA2160 (calculus II), or permission from instructor, graduate standing for GE5560. Advanced calculus (partial differential equations) and linear algebra are useful, but not required. Many homework assignments will be done in Matlab, but you need not be an expert in Matlab to take the course.

Course Description/Overview

This course covers the physics of earthquakes and seismic energy propagation, and seismic methods to determine Earth structure. Emphasis is placed on passive source techniques, with extension to exploration applications.

Course Learning Objectives

Students will gain a solid foundation in principals of seismic wave generation and propagation through theory and applications of modern analysis techniques. Learning will be facilitated through assigned reading, lectures, and homework and project assignments. At the end of the course, students will be able to:

1. derive fundamental seismological equations from first principles;
2. model earthquake sources using seismic waveforms;
3. model Earth structure with multiple techniques; and
4. plan and complete a seismological research project.

Course Resources

Online resources

- Canvas course website: http://www.courses.mtu.edu/courses/1122495
- Personal website http://www.geo.mtu.edu/~gpwaite

Required Course Text

- Stein, S. and M. Wysession, (2003). *An Introduction to Seismology, Earthquakes, and Earth Structure*, Blackwell Publishing. This is a general-purpose seismology textbook that also covers advanced topics

Optional Course Texts

- Gubbins, D. (2004). *Time Series Analysis and Inverse Theory for Geophysicists*, Cambridge University Press. It is *not required*, but is a good reference with seismology examples.
- Kramer, S.L., (1996). *Geotechnical Earthquake Engineering*, Prentice Hall. We will sample a couple of chapters from this book; it is *not required*, but is recommended for those interested in earthquake engineering.
- Shearer, P. M. (2011). *Introduction to Seismology, 2nd edition.* Cambridge. It is not required but is a good companion to Stein and Wysession. It offers less detail in general, but some alternative, perhaps more intuitive descriptions that many students prefer.

Course Supplies

If you have a personal laptop, load Matlab® on it and bring it with you to class every day. See: https://downloads.it.mtu.edu

Grading Scheme

Grading System

Letter Grade	***Range***		
A	***100%***	***to***	***92%***
AB	***< 92%***	***to***	***88%***
B	***< 88%***	***to***	***80%***
BC	***< 80%***	***to***	***78%***
C	***< 78%***	***to***	***70%***
CD	***< 70%***	***to***	***68%***
D	***< 68%***	***to***	***60%***
F	***< 60%***		
I	Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control.		
X	Conditional, with no grade points per credit; given only when the student is at fault in failing to complete a minor segment of a course, but in the judgment of the instructor does not need to repeat the course. It must be made up by the close of the next semester or the grade becomes a failure (F). A (X) grade is computed into the grade point average as a (F) grade.		

Grading Policy

Grades will be based upon homework (35%), quizzes (5%), class participation (5%), final project (20%), and exams (35%).

Late Assignments

Unless you have an acceptable excuse, late assignments will be graded but the maximum achievable value falls off as time in days since the due date to the (-1/4) power. An assignment 1 day late is worth a maximum of 90% and 1 week or more late is worth a maximum of 50%.

Course Policies

Students are *expected* to attend class although attendance is not *required*. Unannounced quizzes may be given. Students are expected be engaged. The use of portable electronic devices is allowed for note taking, but discouraged. No electronic devices, including calculators, may be used during exams or quizzes. If you find it necessary to send messages during class time, please excuse yourself from the classroom.

Collaboration/Plagiarism Rules

Students may work together on homework assignments, but may not explicitly copy the work of others. Students must abide by the University's Academic Integrity Code, which defines plagiarism, cheating, fabrication and facilitating misconduct. Academic misconduct cases will be handled in accordance the University's policies. See: www.admin.mtu.edu/usenate/policies/p109-1.htm

University Policies

Student work products (exams, essays, projects, etc.) may be used for purposes of university, program, or course assessment. All work used for assessment purposes will not include any individual student identification.

Michigan Tech has standard policies on academic misconduct and complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. For more information about reasonable accommodation for or equal access to education or services at Michigan Tech, please call the Dean of Students Office, at (906) 487- 2212 or go to http://www.mtu.edu/ctl/instructional-resources/syllabus/syllabus_policies.html