

## Geology 437 – Seismology and Magnetism, Fall 2006, 4 credits.

[http://www2.umt.edu/geology/faculty/sheriff/437-Seismology\\_Magnetism/437-seismology&magnetism.htm](http://www2.umt.edu/geology/faculty/sheriff/437-Seismology_Magnetism/437-seismology&magnetism.htm)

This course combines some of the theory and global aspects of seismology and magnetism as well as their practical application to environmental problems. Because I want to make sure we get the field work in relatively early in the semester the schedule will seem a little convoluted at first. Basically I will develop enough background in seismology to get started with field assignments and equipment use. Then we will do the same for magnetism. Finally, we will finish the semester with the global and deep interior aspects of each subdiscipline.

**Text:** Lowrie, *Fundamentals of Geophysics*. I expect you to read and study the text as appropriate for topics we are covering in class. The most important use of the text is to get a different perspective/approach to a topic than mine. Other useful texts are available in the library. For spring semester I'll order Reynolds, *An Introduction to Applied and Environmental Geophysics*. In reality both would be useful this semester so if you are feeling rich and intend to take the spring semester you could order Reynolds on your own now.

**Grading:** One midterm (~30% each), one final (~35%), field oriented assignments (~25%), problem sets (~10%). These percentage assignments are all approximate for a number of reasons. For example, if you don't do the problem sets or assignments I'll weight them as 80%. If you do them all but get them wrong I'll weigh them a lot less than 10%. Your participation and discussion during the semester will count towards your grade. All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umt.edu/SA/VPSA/index.cfm/page/1321>.

**Computation:** I expect you to have some familiarity with spreadsheets and that you will learn some of the other software we'll need for the fieldwork. If you think you need to develop these skills now is the time to start.

**Field Assignments:** These will involve you working with two to four others and taking appropriate equipment out and performing an assigned task. You will write a short report on the experiment and results where syntax, grammar and presentation count as does content. I'll provide guidance as we progress. Each individual in a group is responsible for writing their own independent report. In other words, work together, write independently.

**Exams:** I do some derivations in class and use a reasonable number of equations to develop topics. I do not expect you to memorize equations or derivations; you'll get a sheet to use during the exams with all appropriate equations. I do expect you to understand the equations, recognize the variables, and be able to use them to solve geologic problems.

**Exam Schedule:** I prefer to determine the midterm exam time when the schedule is right, when we get through with major topics. We'll schedule it at least a week in advance. Previous exams are linked to the course web site. The final exam will be at the official UM -designated time.

**Course content** will jump around a little to accommodate fieldwork. Interpret this as weather, not disorganization. Maybe it will go like this :

### Seismology

- Basic theory, history, multilayer refraction
- Engineering/environmental scale refraction (field and lab)

### Magnetism

- Basic magnetism; magnetic exploration (field and lab)
- Magnetic field assignment
- Rock Magnetism & Paleomagnetism
- Exploiting magnetic anomalies

### Seismology

- Seismology (T-delta curves, reflection seismology)
- Reflection seismology (crustal scale)

### My goals for the course

- Introduce you to some of the topics in seismology and magnetism pertinent to solid-earth and exploration geophysics
- Teach some of the standard mathematical/geophysical techniques you will need to understand geophysical applications to many geologic problems
- Get you to a level where you can read and understand geophysical literature so you can: 1) evaluate geophysical applications to geological problems, and 2) investigate the use of geophysics in geological problems.
- I believe that any senior level course in our department should prepare you to read the professional literature for the course's topic – that's an excellent way for you to evaluate a course as well. I try to talk about problem solving and experimental design; any good course in science should teach you the techniques and problems of the discipline. **I expect you to read the textbook for the descriptive aspects of the material.**

