Geophysics 524: Observational Seismology
Fall 2007

Course Information:

- Instructor: Susan Bilek, MSEC 358, x6510, sbilek@nmt.edu
- Lecture: T/Th 8:00 am – 9:15 am, MSEC 187
- Office Hours: Mondays 8:30-10:30 am or by appointment

Course Materials:

- Text: An Introduction to Seismology, Earthquakes, and Earth Structure by Stein and Wysession, Blackwell Publishing (available in the NMT bookstore and online)
- Class Website: www.ees.nmt.edu/Geop/Classes/GEOP524.html
    - Links to exercises and data will be provided on the class website as needed.

Overall Grading Policy:

- Exercises: 60%
- Class Presentation: 15% and write-up: 15%
- Class Participation: 10%

Exercises:

As this is an observation-based class, we will focus on learning to make basic seismologic observations and interpretations using real earthquake data. The majority of your course grade (60%) will be based on exercises designed to make various observations and measurements, such as determining focal mechanisms for earthquakes and using receiver functions to describe earth structure. Exercises are to be turned in by the beginning of lecture on the due date.

A word about the computer skills needed - many of the measurements required in the exercises will be done with digital data using combinations of computer programs like MATLAB and SAC (Seismic Analysis Code). The SAC program is available in the geophysics computer lab in MSEC 345. MATLAB is available throughout the campus computing labs. If you are already familiar with these programs, great! If not, don't worry, you will be learning these skills as you complete the exercises throughout the class.

Class Presentations:

In addition to the textbook and lecture material, we will also read relevant research articles highlighting either classic observations or the latest/greatest analysis techniques and observations. Each student will be responsible for presenting a set of papers during a 20 minute class presentation. You will select topics in the first few weeks of class, and presentations will be given throughout the semester (see detailed lecture dates). You will also be required to select 1 key paper relevant to your presentation for the entire class to read. This selection will be emailed or handed out to the class at least one class period before your presentation. Any data examples that you can add to the presentation are encouraged.

You are responsible for turning in a summary (5-8 pages) of your presentation the day of your presentation (see detailed topics list for dates). This summary should highlight the observation or technique discussed, as well as its significance to the field of seismology. You will need to do some additional literature searching and put your own thoughts together in order to discuss the significance of the work. Be sure to properly reference all the articles used in your summary (hopefully you know by this point that direct copying from sources is plagarism and can lead to failure of the course - for questions come see me!).

Class Participation:

I expect that you will attend class regularly, participate in discussion during lectures, and provide questions and discussion during the student presentations.

Lecture Date and Topics:

Lecture Date	Topic	Specific Focus	S&W Readings	Assignments Due
8/21	Introduction	syllabus	chapter 1	
8/23	Background	stress and strain	2.1-2.3	
8/28	Background	seismic waves and ray theory	2.4-2.6; 3.4	
8/30	Background	surface waves and normal modes	2.7-2.9	
9/04	Instrumentation	seismograms as signals	6.2-6.4	
9/06	Instrumentation	seismometers, networks, data	6.6	
9/11	Seismogram Interpretation	arrivals and observations	3.5-3.5.2	Exercise 1
9/13	Seismogram interpretation	earthquake location	7.1-7.2	
9/18	Seismograms and earth structure	tomography, attenuation	7.3; 3.7	

9/20	Seismograms and earth structure	crust	3.2.4	
9/25	Seismograms and earth structure	upper mantle	3.5.3; 3.6; 3.8.3	Exercise 2
9/27	PASSCAL VISIT?			
10/02	TBA			
10/04	Seismograms and earth structure	lower mantle and core	3.5.2-3.5.4; 3.8.4-3.8.5	
10/09	STUDENT PRESENTATIONS	Instrumentation or Structure		
10/11	Seismograms and earthquake sources	focal mechanisms	4.1-4.2	Exercise 3
10/16	Seismograms and earthquake sources	moment tensors	4.4	
10/18	NO CLASS			
10/23	Seismograms and earthquake sources	earthquake geodesy	4.5	Exercise 4
10/25	Seismograms and earthquake sources	source parameters	4.6	
10/30	Seismograms and earthquake sources	source parameters	4.6	
11/01	Seismograms and earthquake sources	waveform modeling	4.3	
11/06	Seismograms and earthquake sources	waveform modeling	4.3	Exercise 5
11/08	Seismograms and earthquake sources	earthquake statistics	4.7	
11/13	Seismograms and earthquake sources	earthquake statistics	4.7	
11/15	STUDENT PRESENTATIONS	earthquake sources		
11/20	Seismotectonics		5.3-5.4	Exercise 6
11/22	NO CLASS	Thanksgiving		
11/27	Seismotectonics		5.5-5.6	
11/29	Seismotectonics		5.7	
12/04	STUDENT PRESENTATIONS	Seismotectonics		
12/06	Class Wrap-up			Exercise 7