

**Geophysical Methods – GEY 445/L or GEY 796/GEY793 - Fall 2004**  
**Room LFG 105 – TR 2:30 – 5:15 pm**

**Instructor:** Catherine Snelson

**Office Hours:** MW 3:00 – 4:00 am; TR 1:30- 2:30 pm; or by appointment

**Office:** LFG 204

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**Web Page:** <http://geoscience.unlv.edu/pub/snelson/GeopMethods/>

**Text:** Looking into the Earth by Mussett and Khan

**Purpose of this Course**

An introduction to geophysical methods, such as measurement techniques, rock properties, and interpretation methods using Seismology, Gravity, Magnetics, Ground Penetrating Radar, Resistivity and Well Logs. The Lab is designed to stress the applied aspects of these techniques. Many problem sets will involve PCs, Macs, and Unix.

**Course Objectives**

Upon completion of this course, you will have hopefully acquired an introductory, but comprehensive understanding of the following topics:

1. Data Acquisition and Processing
2. Seismic Methods
  - a. Seismology and Waves
  - b. Earthquake Seismology
  - c. Refraction Seismology
  - d. Reflection Seismology
3. Non-Seismic Methods
  - a. Gravity
  - b. Magnetics
  - c. Resistivity, IP, SP, EM, and Ground Penetrating Radar (GPR)
  - d. Radioactivity and Geothermal
  - e. Well Logging
4. Applications

**Problem to Address**

You have been recently hired by GeoFissure Inc. for your geophysical talents on a probationary term until December 2004. Your team had been given a very important project to identify and map the fissures and faults in Pahrump. Since you are newly hired and the CEO is under the impression you know your geophysics, its time to figure out which techniques will work or wont work for this problem. You are required to submit a Technical Report that reports your findings at the end of the probationary period, where it will then be determined whether or not you can keep you job.

**Grading:**

Lead Presentation: 10%

Summary Reports (2): 20% each

Case Study Presentation: 10%

Labs: 10%

Final Project: 30%

2 Summary Reports will be required that include material covered from the lecture and lab materials, and exercises. A 10-minute oral presentation is required over a case study from chapters 21-28, graduate students are required to submit a 2-page summary of the case study. Lab exercises will range from homework problems to analysis of data acquired. The final project is a group project and will consist of a detailed analysis of one or more datasets acquired throughout the semester. A 10-page Report is due on the groups' analysis with the graduate students presenting these results in an AGU poster format.

### **Labs**

Labs will be applied using equipment appropriate for each technique. The student will learn how to use the equipment as well as understand the limitations and benefits of each technique. The student will acquire, analyze, and interpret each dataset in a team environment. There will be 2 trips off campus to collect data.

### **Succeeding!**

To do well in this class you should study and work with the material daily. At the end of each day, read your notes and make sure that you understand what you wrote. Better yet, re-write your notes in a second notebook using complete sentences: if something isn't clear in your own mind it will be readily apparent to you. You should do this no later than 24 hours after class. Even though they are not assigned, write out answers to the questions at the end of each chapter. If you develop a study group, you will learn more and the experience will be more enjoyable. Keep up with reading assignments, labs, and lecture material. It is harder to come from behind than to stay engaged daily. If you get confused or have questions that have not been resolved in lecture or laboratory, then do not hesitate to contact me. If you cannot make any of the office hours, call or email for an appointment.

### **Logistics and Policies**

#### **1. Participation:**

Physical Geology (GEY 101) is recommended, PHY 151 or 180 is required, and some computer experience is necessary. This course is for both undergraduates and graduate student so I expect that students will come to this class with very different backgrounds and levels of educational training. As a result, you may find some material difficult, feel that you are already familiar with some of the concepts, or have personal experiences that can inform us all. Whatever your situation, please share your position with us through class participation. Most importantly, however, if you are confused about a concept, **please ask questions** in class for clarification and further explanation. You will not be alone in your confusion. There are many ways to present this material, and I will attempt to find one that works for you. If you do not feel comfortable asking questions in class, please write the questions down and drop them on the front desk as you enter the room and I will address them during class.

#### **2. Attendance**

It is important that you attend class daily because we cover a lot of material, and I will provide guidance for reading assignments and exam questions regularly. You are responsible for all material covered in lectures whether or not your absence is excused. If you miss a lecture, get the notes from a classmate. **Neither make-up lectures nor make-up exams will be given** except as specified below. Topics covered may vary from the schedule somewhat, but the exam dates remain fixed. If you are absent from either a scheduled lecture or a lab exam without a written medical or university excuse, you will receive a zero for the exam. Excused absences are evaluated on the average of the exams actually taken. All exams will focus primarily on the most recently covered materials presented in lecture, the laboratory, and reading assignments. **Concurrent enrollment in a lab section is**

**required.** You must enroll for a section of GEY 445XL for zero credit hours or for graduate students GEY 793 for 1 credit. Required field trips will be held during your lab meeting.

### **3. Cheating, Plagiarism, and Academic Dishonesty**

You are required to be familiar with university policies and procedures in the current UNLV Undergraduate Catalog. Importantly, we follow the policies on Cheating, Plagiarism, and Academic Dishonesty that are stated in the most recent UNLV Undergraduate Catalog. In the hopes of deterring incidents of cheating and/or plagiarism this class employs a "**zero tolerance**" policy meaning that if a student commits cheating or plagiarism they receive a grade of F for the class.

### **4. Copyright Issues**

The university requires all members of the University Community to familiarize themselves and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The University will neither protect you nor defend you nor assume responsibility for employee or student violations and fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability as well as disciplinary action under University policies. To help familiarize yourself with copyright and fair use policies, the University encourages you to visit its copyright web page at <http://www.unlv.edu/committees/copyright>.

### **5. Disability Services (DS)**

If you have a **documented** disability that may require assistance, you will need to contact the Disability Services (DS) for coordination in your academic accommodations. Disability Services is located within Learning Enhancement Services (LES), in the Reynolds Student Services Complex, Suite 137. The DRC phone number is 895-0866 or TTD 895-0652. If you have a special need/disability, please let me know outside of class sometime during the first week of the course. This helps me to adjust or alter plans so that problems can be minimized and your learning experience can be maximized.

### **6. Writing Center**

Students are welcome to use the UNLV Writing Center free of charge. Consultants can assist students at all stages of the writing process. Students may make appointments by calling the center (895-3908) or in person at FDH-240. The center can be particularly helpful when you are writing or rewriting your lab field reports.

### **7. Religious Holidays**

A student missing a class or laboratory assignment because of observance of a religious holiday shall have the opportunity to make up missed work. You must notify me by the last day of late registration to be assured of this opportunity. If this pertains to you, a clear deadline will be set for completion of work.

**8. Nondiscrimination** - The University of Nevada Las Vegas does not discriminate on the basis of race, color, creed, religion, national or ethnic origin, gender, age, sexual orientation, disability, or veteran status.

### **9. Official Extracurricular Activity**

All students who represent UNLV at an official extracurricular activity shall have the opportunity to make up assignments, but you must provide official written notification to me prior to the missed class(es).

### **10. Learning Environment**

The classroom is intended to be a place of learning. As such and as specified in the UNLV Undergraduate and Graduate Catalogs, no pagers, cell phones, or other potentially disruptive devices are allowed in either lecture or the laboratory.

## CLASS SCHEDULE

Wk	Date	Lecture/ Lab Topic	Leader	Reading Assgn.
1	Aug. 31 Sept. 2	Intro Geophysics, Data Acquisition Data Acquisition and Processing	Cathy Cathy	Ch. 1-3 Ch. 1-3
2	Sept. 7 Sept. 9	Seismic Refraction Seismology Seismic Reflection Seismology	Cathy Aaron	Ch. 6 Ch. 7
3	Sept. 14 Sept. 16 Sept. 13-19	No Class - Experiment No Class - Experiment Seismic Refraction Experiment		
4	Sept. 21 Sept. 23	Global Seismology and Earthquakes Earthquake Analysis Lab – On Campus	Darlene	Ch. 4 & 5
5	Sept. 28 Sept. 30	<b>Summary Reports</b> Seismics Lab – On Campus		Ch. 1-7
6	Oct. 5 Oct. 7 Oct. 9 (Sat)	Gravity No Lab – Field Trip Seismics Lab – Pahrump	James	Ch. 8-9
7	Oct. 12 Oct. 14	Magnetism Magnetics and GPR Lab – On Campus	Robyn	Ch. 10 & 11
8	Oct. 19 Oct. 21	EM and GPR No Lab – Comp Time	Robyn	Ch. 14
9	Oct. 26 Oct. 28 Oct. 29 (Fri)	Resistivity, IP, and SP No Lab – Field Trip Mag, Gravity, and GPR Lab - Pahrump	Darlene	Ch. 12 & 13
10	Nov. 2 Nov. 4	<b>Summary Reports</b> Radioactivity and Geothermal	Aaron	Ch. 8-14 Ch. 15-17
11	Nov. 9 Nov. 11	No Class - GSA No Lab – Veterans Day		
12	Nov. 16 Nov. 18	Subsurface Geophysics Lab – Work on Projects	Cathy	Ch. 18
13	Nov. 23 Nov. 25	Examples of Applications No Lab – Thanksgiving Holiday	Cathy	Ch. 19 & 20
14	Nov. 30 Dec. 2	<b>In Class Presentation of Case Studies</b> Lab – Work on Projects		Ch. 21-28
15	Dec. 7 Dec. 9	<b>Final Project Presentations – Wrap-up</b> <b>Final Project Presentations – Wrap-up</b>		
16	Dec. 14	Final Reports Due		