

**ERTH 457/GEOP 557**  
**Reflection Seismic Data Processing**

**Instructor:** Dr. Catherine Snelson  
MSEC 354  
835-6661  
snelson@ees.nmt.edu

**Office Hours:**

**Course Format:** Lecture twice a week, Lab once a week

**Required Text:** Seismic Data Analysis by Yilmaz, O., SEG Investigations in Geophysics no. 10, v. I & II

**Online Materials:** WebCT6: <http://webct6.nmt.edu/webct/logonDisplay.dowebct>

**Purpose of this Class:**

This class is designed for geologists, geophysicists, and petroleum engineers interested in learning the fundamentals of reflection seismic data processing. The class provides hands-on experience in the processing of seismic reflection data. Topics covered include: definition of survey geometries, data editing techniques, amplitude recovery, bandpass filtering, deconvolution, velocity analysis, F-K filtering, and migration.

**Grading:**

Exam	20 %
Computer Lab Assignments	50 %
Final Project	30 %

A: 90 - 100 – \*‘‘Excellent knowledge of concepts and/or techniques together with a high degree of skill and/or some elements of originality in satisfying the requirements of a piece of work or course.’’

B: 80 – 89 – \*‘‘Good level of knowledge of concepts and/or techniques together with a considerable skill in using them in satisfying the requirements of a piece of work or course.’’

C: 70 -79 – \*‘‘Acceptable level of knowledge of concepts and/or techniques together with some skill in using them to satisfy the requirements of a piece of work or course.’’

D: 60 – 69 – \*‘‘Minimum knowledge of concepts and/or techniques needed to satisfy the requirements of a piece of work or course.’’

F: Below 60 – Failing

\*Grade descriptions from [http://www.cse.yorku.ca/course\\_archive/2001-02/W/3461/M/LetterGrading.htm](http://www.cse.yorku.ca/course_archive/2001-02/W/3461/M/LetterGrading.htm)

## Class Schedule

Week	Topic	Readings	Lab
1	The Seismic Reflection Method, Intro to Data Processing	Intro, Ch. 1	Introduction to ProMAX
2	SEG Tape Formats, Experiment Geometries	Handout, Ch.1	Reading Tape Dumps, Using Stacking Charts
3	Trace Editing, Muting, Amplitude Recovery	Ch. 1	Trace Editing, Muting, Gain Application
4	DSP Review, Filtering	Ch. 1	Filtering I
5	Bandpass Filtering, Temporal Resolution	Ch. 1	Filtering II
6	Deconvolution	Ch. 2	
7	Review, Midterm Exam		No Lab, Midterm
8	Deconvolution	Ch. 2	Deconvolution
9	Velocity Analysis, Normal Moveout	Ch. 3	Velocity Analysis, Normal Moveout
10	Stack, Migration	Ch. 4, 5, 8	Stacking
11	Migration, Spatial Resolution	Ch.4, 5, 8	Post-Stack Migration
12	Refraction Statics, Residual Statics	Ch. 3	
13	F-K Filtering, Multiple Suppression	Ch. 6	Multiple Suppression, F-K Filtering
14	Vibroseis Correlation, AVO, VSP Processing	Ch. 11	
15	Modeling, 3D	Ch. 7, 9, 10	
16	Final Project Due		

## **Changes to Syllabus:**

The following schedule is tentative; adjustments to the schedule of topics and reading assignments may be made in accordance with the rate of progress in the classroom. The instructor also reserves the right to change a lecture topic to reflect world events. Students will be provided with an updated syllabus if significant changes are necessary. **Keep in mind that ANYTHING in the chapters is fair game for exam questions, not just what I present in lecture. It is in your best interest to actually read the text, assignments, labs and use WebCT6.**

## **Logistics and Policies**

### **1. Participation**

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 a variety of learning styles and I will attempt to present the material in ways that will be effective for all of you. If you do not feel comfortable asking questions in class, please see me after class, during office hours, via e-mail, or post a message in the anonymous section of the WebCT6 course site.

### **2. WebCT6**

In this class I will be utilizing WebCT6 (<http://webct6.nmt.edu/webct/logonDisplay.dowebct>) to provide online access to lecture notes, exercises, and exam reviews and also your grades. You will find WebCT6 to be an essential complement to the course; however it is not a substitute for regular class attendance. **Some exercises will be required to be completed on WebCT6, so I you need to regularly access the course site and see the resources that are available.** It is YOUR responsibility to verify that any online materials have been completed and properly submitted. Otherwise there will not be a grade for that assignment and you may not receive full credit.

### **3. Attendance**

It is important that you attend class regularly, 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 no matter what causes your absence. If you miss a lecture the notes can be retrieved from WebCT6. **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 and dates where exercises have been scheduled remain fixed. If you are absent from a scheduled exam in lecture or in-class exercise without a written medical, military, or university excuse, you will receive a zero for that exam or exercise.

### **4. Privacy**

Under the Family Educational Rights and Privacy Act (FERPA) your quiz, exam and final grades are confidential unless you have specified, in writing, that others are granted access to such information. **I do not give out grades via telephone or e-mail.** In addition please do not ask to collect any graded material for any of your classmates.

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

You are required to be familiar with university policies and procedures in the current NMT Catalog (Fall 2007 – Spring 2009). Those policies are outlined in the section on Institutional Values (p. 9), Academic Policies (p. 43 – 46) and at <http://www.nmt.edu/mainpage/policies/honest.pdf>. 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 and a notation may be added to your transcript to indicate academic misconduct.

### **6. Disability Services**

The Disability Services coordinates all academic accommodations for students with documented disabilities. NMT complies with the provisions set forth in Section 504 of the Rehabilitation Act of 1973

and the Americans with Disabilities Act of 1990, offering reasonable accommodations to qualified students with documented disabilities. If you have a documented disability that may require accommodations, you will need to contact Disability Services for the coordination of services. The Disability Services is located in the Joseph A. Fidel Center, phone 505-835-6619/5443, 800-428-TECH, or [counseling@admin.nmy.edu](mailto:counseling@admin.nmy.edu). For additional information, please visit: [http://infohost.nmt.edu/~stuaffs/disabilities\\_main.htm](http://infohost.nmt.edu/~stuaffs/disabilities_main.htm). If the Disability Services contacts me regarding any accommodations you may need I assure you that confidentiality will be maintained.

### **7. Religious Holidays**

As a general rule, a student missing a class or assignment because of observance of a religious holiday shall have the opportunity to make up missed work. You must notify me, by the third week of classes, if this pertains to you and a clear deadline will be set for completion of work.

### **8. Nondiscrimination**

NMT 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 NMT at any official extracurricular activity have the opportunity to make up an assignment. However, you must provide official written notification to me at least 1 week 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 NMT Catalog under Institutional Values (p. 8), I ask that no pagers, cell phones, or other potentially disruptive devices are to be used during lecture. These devices should be turned off or turned to the “silent mode”. Any other activities which disrupt the class or interfere with the learning experience of others will not be tolerated. If these guidelines are not followed I may, as outlined in the University Catalog, initiate an administrative drop.

### **11. Copyright**

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 NOR DEFEND YOU NOR ASSUME ANY RESPONSIBILITY FOR EMPLOYEE OR STUDENT VIOLATIONS OF 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.

### **12. Succeeding!**

- a. Be prepared for class
- b. Show up (The ones that do the best in the class are those that attend regularly)
- c. Turn off or silence your cell-phone/pager/other noisy device (It is annoying).
- d. Pay attention (No chit-chat with your neighbor about weekend exploits. Those around you don't care)
- e. Ask questions and participate
- f. Review/compare notes
- g. Utilize web resources
- h. Do your own work
- i. Use office hours (Not just before the exams).