

Introduction to Geophysics
GEOP 3320 (3 credit hours)
Spring 2018

Instructor:

Time: 5 contact hours/week—2 hours of lecture and 3 hours of lab

Recommended Textbook: There will be selected reading assignments posted weekly in Blackboard but students are also advised to purchase Burger, Jones, Sheehan (2006) *Applied Geophysics*, 1st edition, WW Norton & Company, Inc.; Mark E. Everett (2013) *Near-Surface Applied Geophysics*, Cambridge University Press; or similar text

Prerequisite: GEOL 3312 Geological Processes

Course Description: Survey of Geophysical methods with an emphasis on practical applications of seismic and non-seismic exploration methods. Students will collect, process, and interpret data, design surveys, and learn what information each of the basic methods can provide and their limitations. Written reports will be required for each lab.

Learning Outcomes: By the end of the course successful students will be able to use a variety of geophysical methods to solve basic exploration problems in the geosciences and environmental sciences. They will be aware of the sources of additional information and have a useable knowledge of each of the basic techniques.

Students will collect, process, and interpret geophysical data and will learn to select the appropriate method(s) to solve a problem and to design a survey.

Tentative Course Schedule:

WEEK	TOPIC
1	Earthquake seismology: picking arrivals, travel times, and the velocity structure of the Earth—Lab using the 24 channel seismic recorder to collect data on campus
2	Refraction seismology: Snell's law, travel paths—lab on interpreting seismic refraction data—including the data collected the previous week, computer modeling first arrivals for various velocity models
3	Reflection seismology: travel paths, amplitudes, velocities, design of surveys for CMPs—lab on modeling a vertical incident seismic section and comparison with actual sections
4	Reflection seismology: processing and interpretation of data—lab on data processing using Promax and demonstration of Petrel software for interpretation

5	Reflection seismology: data interpretation using all of the previous topics—lab will be involve groups in constructing and presenting their interpretation of a data set in class.
6	Gravity method: introduction to the Earth’s gravitational field and how it is used to map changes in density in the subsurface—lab will be a field trip to collect gravity data near campus
7	Gravity method: processing of gravity data, gravimeters, accuracy and precision—lab on the reduction of gravity data and interpretation of gravity contour maps
8	Gravity method: applications of the gravity method and 2- and 3_D modeling – lab will include group analysis of a data set with basic computer modeling using Talwani software—presentation of the interpretations to the class
9	Magnetic method: introduction to the Earth’s magnetic field and its general properties. How it can be used to map changes in the subsurface—lab will be a field trip to collect magnetic data in the same area as the earlier gravity work
10	Magnetic method: Processing and interpretation of data—lab on modeling with gravity data as a group activity. Extend the application of the Talwani software. Presentation of results to the class
11	Magnetic method: Paleomagnetism, applications and interpretation, impact on the use of magnetic data to interpret subsurface lithology—lab on the interpretation of Paleomagnetic information.
12	Electrical methods: introduction to the various electrical methods and properties of rocks they measure, design of Resistivity, conductivity, GPR and SP arrays—lab field trip to the same area as previously visited to collect data
13	Electrical methods: GPR and processing and interpretation of resistivity/conductivity data—lab will include the interpretation of data collected in the previous lab.
14	Electrical methods: Magnetotellurics (MT)—collection and processing, interpretation, errors and applications for all electrical methods – lab using MT data to interpret subsurface variations
15	Integration of Geophysical methods —discussion of how the methods can be used together to provide support for individual interpretations and how to combine multiple types of data into a single model—lab on revisiting all of the previous works and revising interpretations to accommodate multiple sources of data.
	Final group report over the field site where the data was collected will be due at the start of Final’s week

Grades:

Homework and in-class assignments: 25%

Quizzes and exams: 25%

Lab reports: 25%

Final group report: 25%

Course Procedures:

This class is a **HYBRID** class which means that more than 50% of the course is online. **THIS IS NOT A LECTURE CLASS!** Students are expected to take an active role in the class meetings. **Computer and Internet use outside of class are absolutely required for this class.** Students need to have their free UTEP email account activated for this course and they need to check it regularly.

Process:

Students must check Blackboard at least every other day to make sure they have the latest assignments and information. The instructor will **not** modify a Blackboard assignment or due date to accommodate individual students unless there is a recommendation from the DSSO office. The due dates are absolute and there is no way to hand in late work or take quizzes after they have closed. You will be given zero credit for work not done and turned in on time. Turn in something incomplete for partial credit if necessary.

Before each class:

- * Read the assigned materials--make sure you have done this *before* class
- * Identify concepts that are central to understanding the topics to be discussed
- * Prepare a list of questions from the reading for which you need further clarification
- * Answer the assigned questions and submit them before class begins

During each class:

- * There will be quizzes and activities throughout the class (stay awake!)
- * Take careful notes
- * Be an active participant—including all classroom activities and discussions.

There are no regularly scheduled exams but the online and/or in-class quizzes will be elevated to full exams if it appears that students are arriving to class unprepared for the current class discussion

Turn your cell phone ringer off! Anyone can make a mistake once but I will start taking points off of your grade if it happens more than once.

POLICY ON CLASS PARTICIPATION: You are expected to come to class prepared to discuss the assigned topic. You should have a good understanding of the reading and bring a calculator, ruler, and paper to use during class. Arriving late for class and/or coming unprepared will significantly reduce your grade for the class.

DISABILITY STATEMENT: If a student has or suspects he/she has a disability and needs an accommodation, he/she should contact the Disabled Student Services Office (DSSO) at 747-5148 or at dss@utep.edu or go to room 106 Union East Building. The student is responsible for presenting to the instructor any DSS accommodation letters and instructions.

MILITARY STATEMENT: If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to let me know well in advance.

POLICY ON MAKE-UP EXAMINATIONS: **NO** make-up exams will be given for reasons other than serious illness (doctor's note required), absence with the instructor's prior approval, or when a student is on official University business (documentation required). There are no make ups for quizzes or in class activities. If you arrive late and miss something, it is your responsibility to get the information or assignment on your own.

POLICY ON ACADEMIC HONESTY: **Academic Dishonesty will not be tolerated. All university guidelines will be strictly followed. Please read these guidelines carefully. If you have any questions regarding the university policy please contact the Dean of Students.**