

26-380-607-S01: Seismic and potential field environmental geophysics Fall 2007 Syllabus

Instructor: Dr. Lee Slater

Office: 136 Smith Hall (Office Hours: T 4:30 to 6:00 pm)

Meeting Time: 6.00 to 9:00 p.m. T – Smith 127

Course Description: This course examines near-surface geophysical methods and the growing application of these techniques in environmental & engineering studies. This is a graduate class and will require significant self motivation and independent study in preparation for the weekly meetings. The class will often take a seminar format. Participation in problems set in class is expected. A day of fieldwork (to be scheduled) is compulsory as it provides an opportunity to work with the geophysical methods introduced during the lectures and will contribute to ongoing geophysical research conducted by PhD students at Rutgers-Newark.

The methods covered include [in order of priority]:

- Seismic refraction
- Seismic reflection
- Magnetism
- Gravity

Generic to all methods are the following aspects that will be covered in class:

- Geophysical properties of soils and rocks
- Relationships between hydrogeological and geophysical properties
- Environmental applications of these methods

Specific Learning Objectives

- Comprehension of the theory of application of seismic and potential field techniques in environmental studies
- Understanding of the link between geophysical properties controlling seismic and potential field signals and subsurface environmental parameters
- Understanding of field survey procedures in seismic and potential field methods
- Competency running seismic and potential field instruments
- Ability to perform basic processing of seismic and potential field datasets using current software packages
- Able to provide an informed interpretation of processed seismic and potential field datasets

Text:

There is no required text for this class. However, I strongly recommend the following read:

Steeple, D., 2005, Shallow Seismic Methods, In: Hydrogeophysics, edited by Rubin, Y and Hubbard S. S., Chap. 8., Springer, Dordrecht, The Netherlands

This text can be special ordered from New Jersey Bookstore on University Avenue.

The following is a list of other texts but most of these are fairly dated:

- Reynolds, J. M., 1997, An Introduction to Applied and Environmental Geophysics, John Wiley & Sons
- Kelly, W.E. and Mareš, S., 1993, Developments in water science 44: applied geophysics in hydrogeological and engineering practice, Elsevier Science Publishers
- Milson, J., 2003, Field Geophysics, Third Edition, The Geological Field Guide Series, John Wiley & Sons
- Sharma, P. V., 1997, Environmental & engineering geophysics, Cambridge University Press
- Telford, W.M., Geldart, L.P. and Sheriff, R.E., 1990, Applied Geophysics, Second Edition, Cambridge University Press
- Vogelsang, D., 1995, Environmental geophysics: a practical guide, Springer-Verlag
- Ward, S. H., 1990, Geotechnical and environmental geophysics, Volumes I-III, Society of Exploration Geophysicists

The following are also useful references:

- Meju, M.A., 1994, Geophysical data analysis: understanding inverse problem theory and practice. SEG Course Notes Series, Volume 6 (S.N. Domenico, Editor), Society of Exploration Geophysicists
- Sheriff, R. E., 1994, Encyclopedic dictionary of exploration geophysics, Third Edition, Geophysical Reference Series 1, Society of Exploration Geophysicists

Your Assignments

You will be encouraged to work in teams in class and on class assignments

- *Weekly assignments:* Due in class the following week
- *Class preparation:* You will be expected to prepare in advance for each class and contribute actively in the class. This may include making presentations on your assignments to other class members. You will be graded in part on your participation in class
- *Quick quizzes:* These will sporadically occur in class and may involve some audience participation
- *Mid-term:* a mid-term exam will be given
- *Written papers:* two written papers will be assigned

Grading:

You will be graded on assignments, class participation, written papers and the occasional quick quiz.

Weekly assignments/class participation[§]: 30 %

Written papers[§]: 20 %

Midterm: 20 %

Field trip write up: 20 %

Quick quizzes: 10 %

§ Late assignments/papers: up to one week late will receive a 50% reduced grade penalty; I won't accept assignments more than one week late.

SERIOUS STUFF:

Americans with Disabilities Act Statement: If you need accommodations because of a documented disability, contact the Disabled Student Services Office on x5300

Academic Honesty Policy: Cheating in any form will not be tolerated. The first occurrence of any of this behavior will result in a grade of "F".