# 26-380-606-S01: Electrical Environmental Geophysics
# Spring 2008 Syllabus

***Instructor*:** Dr. Lee Slater
***Office*:** 135 Smith Hall (Office Hours: T 4:30 - 5:30 pm)
***Meeting Time***: 6.00 to 9:00 p.m. T – Smith 127

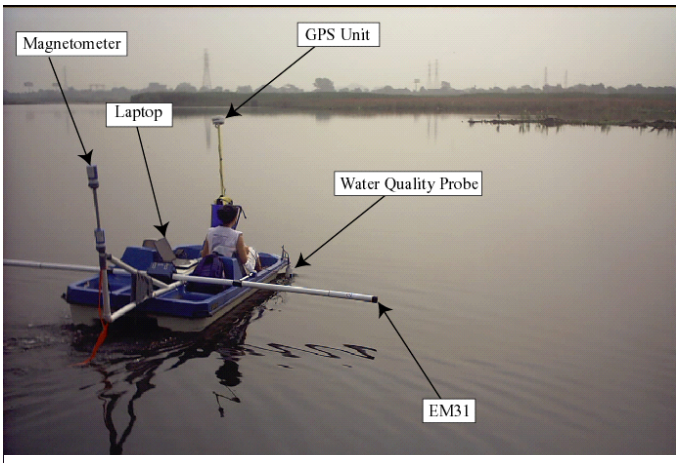
**Course Description:** This course provides a comprehensive introduction to the 'electrical-based' near-surface geophysical methods and the application of these techniques to environmental & engineering studies. This is a graduate class and will require significant self motivation and independent study in preparation for the weekly meetings. Participation in problems set in class is expected. A day of fieldwork will be planned: participation in fieldwork is mandatory as it provides an opportunity to work with the different geophysical methods introduced during the lectures.

The methods covered will include [in order of priority]:

- Electrical resistivity/induced polarization [including electrical imaging]
- Ground penetrating radar (GPR)
- Electromagnetic induction

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 electrical methods




***Marine-based geophysical surveys by Rutgers students in the Hackensack Meadowlands***

**Specific Learning Objectives**

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

**Text:**
There is no required text for this class. I have recommended the following text (available from the University Bookstore)
*Rubin, Y. and Hubbard, S.S., 2005, Hydrogeophysics (Water Science and Technology Library), Springer, 523 pp, ISBN: 1402031017*

Other texts that I will reference from include:

- Butler, D.B., Editor, 2007, Near Surface Geophysics, Investigations in Geophysics #13, Society of Exploration Geophysicists, Tulsa, OK.
- 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

**Field Research Experience:**
A field research experience is critical to any class in Environmental Geophysics, even when the class is constrained to a 6-9 pm evening slot. As everyone has very different schedules, I hope to provide each student an opportunity to work with one of my PhD students and myself on an electrical geophysics project. You are required to get involved in order to fulfill a minimum requirement of 1 day of field experience with one of the electrical geophysics methods we will cover in class. Hopefully, some of you may choose to take advantage of an opportunity to perform more than 1 day of fieldwork/assistance

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

- *Class preparation*: You will be expected to prepare in advance for each class and contribute actively in the class. This will 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
- ***Write up of fieldwork:*** data processing, write up and presentation of work to class, other graduate students and any interested faculty in the department. We will schedule a presentation towards the end of the semester.

**Grading:**
You will be graded on assignments, class participation and the occasional quick quiz. A significant part of the grade will be based on a write-up of the geophysical data collected in the fieldwork experience. This will be the most extensive piece of work that you will conduct during this course.

Weekly assignments/class participation: 30 %
Field assignment or written paper: 30 %
Mid-Term Exam: 30 %
Quizzes: 10 %
***Late assignments will be graded at 50% if handed in up to 2 days after the due date. Assignments will not be accepted for grading after 5 pm on the second day after the due date.***

**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"