

HYDROGEOPHYSICS - 2013

Course unique number: GEO 382W - 27853
GEO 476W - 27813

Meeting time – Thursday 2:00-4:00 PM in EPS 2.104 Time is, but this can be changed if necessary - to be determined by class poll. Plus time during 4 weekends during the semester.

Instructors: Jack Holt (jack@ig.utexas.edu)
Jeff Paine (jeff.paine@beg.utexas.edu)
Jack Sharp (jmsharp@jsg.utexas.edu)

Offices & office hours:

Holt – ROC 2.262 (Pickle Campus)

Paine – BEG 2.102J (Pickle Campus)

Sharp – EPS 3.150 & JGB 6.110 - W & F 11-12 or by appointment.

This Fall 2013 graduate/upper level undergraduate course surveys the major geophysical methods that are applied in hydrogeological investigations. The class is intended for hydrogeology, geophysics, or engineering students with an interest in practical interpretations. The class will consist of modules, including:

- Use of the Total Station and GPS for precise location of the test site(s)
- Electrical resistivity (ER)
- Ground penetrating radar (GPR)
- Electromagnetic surveying (EM & TDEM)
- Gravity methods
- Seismic refraction

Each module includes: 1) lecture on method theory and its hydrogeological applications (1-3 lecture hours), 2) using the instruments in the field, and 3) analysis of the data, interpretation, and hydrogeological insights. Grades will be based on participation in classes and field exercises, written field exercise summaries, field notebook content, literature reviews, a report on the application of a geophysical method or methods to a hydrogeologic study, and your final report/presentation (group or individual) on the hydrogeology of the site(s). Hopefully, the last will be publishable. Several sites are now under consideration including a cave site (Flint Ridge Cave), a possible in-filled sinkhole site, and along the Nueces River near Uvalde, Texas.

Prerequisites: Graduate standing, undergraduates need permission from one of the faculty. Some background in hydrogeology or geophysics is necessary. A background in both fields is ideal.

Text: No text is required, but the students should refer to one of the following texts for general background information. Please note the reading dates in the syllabus

References:

Burger, H.R., 1992, Exploration Geophysics of the Shallow Subsurface: Prentice-Hall, Englewood Cliffs, NJ, 489p.

Dobrin, M.B., 1960, introduction to geophysical prospecting (2nd ed.): McGraw-Hill Book Co., New York, 446p. [*an old "classic"*]

Kirsch, R. (ed.), 2009, Groundwater Geophysics – A Tool for Hydrogeology (2nd ed.): Springer-Verlag, Berlin, 548p.

Rubin, Y., and Hubbard, S.S., (eds.), 2005, Hydrogeophysics: Water Science and Technology Library, Springer, Berlin, v. 50, 523p.

Sharma, P.V., 1997, Environmental and Engineering Geophysics: Cambridge University Press, Cambridge, UK, 475p.

Grading:

Field participation and field reports	40%
Field notebooks	10%
Literature reviews	25%
Individual projects	25%

For more information, contact:

Jack Holt at jack@ig.utexas.edu,

Jeff Paine at jeff.paine@beg.utexas.edu, or

Jack Sharp at jmsharp@jsg.utexas.edu .

Date:	MODULE	READINGS
Aug, 29	Introduction, requirements Set tentative field trip dates	Kirsch, Ch. 1 Rubin & Hubbard, Ch. 1
Sep. 5	Introduction to hydrogeophysics	
12	ER Literature review paper	Kirsch, Ch. 3 Rubin & Hubbard, Ch. 4 & 5 Burger, Ch. 5 Sharma, Ch. 6 & 12
19	EM Literature review paper	Kirsch, Ch. 4, 5, & 6 Rubin & Hubbard, Ch. 1

		Sharma, Ch. 7& 12
26	GPR Literature review paper	Kirsch, Ch. 7 Rubin & Hubbard, Ch. 7 Sharma, Ch. 8
Oct. 3	Gravity Literature review paper	Kirsch, Ch. 11 Burger, Ch. 6 Sharma, Ch. 2
10	Seismic reflection/refraction Literature review paper	Rubin & Hubbard, Ch. 9 Burger, Ch.4
17	Review of field results to date and planning for final fieldwork (Preliminary reports by student groups)	
24	Other methods Literature review paper <i>[JWH out this week]</i>	Kirsch, Ch. 8. 9. 10 Rubin & Hubbard, Ch. 16 & 17 Burger, Ch. 7
31	Update on field results Data merging and coupled interpretations Literature review paper (coupled methods)	
Nov. 7	Airborne geophysics Planning final field day Literature review paper	Kirsch, Ch. 5& 6 (again) Rubin & Hubbard, Ch. 1
14	Final review of field results Group reports on each method	Rubin & Hubbard, Ch. 3
21	Class final report Arrange for preparation of paper for scientific journal.	
28	<i>No class – Thanksgiving</i>	
Dec. 5	Class final report Arrange for preparation of paper for scientific journal.	

POSSIBLE FIELD TRIP DATES – to be determined based upon student and professor schedules.

	Saturday	Sunday
Sep		8
		22
	28	29

Oct	5	6
		13
	19	20
Nov.	9	10
		17
	23	24

Other: (We all know or can infer these but there are UT directives that you are to be informed of the following):

1) *The honor code* (how it applies to each class, and develop a more thorough description of what constitutes acceptable practices in our classrooms.)

“The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity and responsibility. Each member of The University is expected to hold these values through integrity, honest [*sic*], trust, fairness, and respect toward peers and community.”

No plagiarism or copying of others work for tests, term papers, pop quizzes, or laboratory problem sets is acceptable. Plagiarism or copying is subject to dismissal from the class with a zero grade. An explanation of plagiarism can be found at <http://registrar.utexas.edu/catalogs/gi09-10/index.html>.

Group learning can be beneficial, so I encourage you to work with each other on occasion, and not always in isolation. However, if 3 of your team up to analyze, for example, the data from a Guelph permeameter or the Theis curve matching, you owe it to yourself to do the calculations yourself again from scratch.

2) *Students with disabilities:*

The University of Texas provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, <http://www.utexas.edu/diversity/ddce/ssd/>.”

3) *Classroom etiquette:* (Chana Lee, reported in the Chronicle of Higher Education, 27 March 1998): “Please do not hold conversations with classmates when the professor or another student is speaking. Also refrain from passing notes, reading ...[The Daily Texan], or participating in disruptive classroom behavior. Your undivided attention is a must. An atmosphere of mutual respect is in order...”

4) *Religious holidays:* “By UT Austin policy, you must notify your instructor(s) of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.”