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 MISC \_\_\_\_\_

**Graduate Programs—NEW COURSE PROPOSAL**

DEPARTMENT NAME: **GEOSCIENCES** COLLEGE OF: **SCIENCE**

RECOMMENDED COURSE IDENTIFICATION:  
 PREFIX GLY COURSE NUMBER 6825 LAB CODE (L or C) \_\_\_\_\_  
 \_\_\_\_\_  
 (TO OBTAIN A COURSE NUMBER, CONTACT ERUDOLPH@FAU.EDU)  
 COMPLETE COURSE TITLE  
**METHODS IN HYDROGEOLOGY**

**EFFECTIVE DATE**  
 (first term course will be offered)

CREDITS:  
 3

TEXTBOOK INFORMATION:  
 No textbook required. Supplementary readings will be made available on Blackboard.

GRADING (SELECT ONLY ONE GRADING OPTION): REGULAR  PASS/FAIL \_\_\_\_\_ SATISFACTORY/UNSATISFACTORY \_\_\_\_\_

COURSE DESCRIPTION, NO MORE THAN 3 LINES:  
 This course is designed to introduce students to practical aspects of hydrogeology, including project design, field methods, and data analysis.

PREREQUISITES W/MINIMUM GRADE: \*  
 Minimum grade of a C in GLY4822 or equivalent or permission of instructor

COREQUISITES:

OTHER REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL):

PREREQUISITES, COREQUISITES & REGISTRATION CONTROLS SHOWN ABOVE WILL BE ENFORCED FOR ALL COURSE SECTIONS.  
 \*DEFAULT MINIMUM GRADE IS D-.

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:

Other departments, colleges that might be affected by the new course must be consulted. List entities that have been consulted and attach written comments from each. *Civil and Environmental Engineering*

Tara Root, troot@fau.edu, 561-297-3253  
 Faculty Contact, Email, Complete Phone Number

**SIGNATURES**

**SUPPORTING MATERIALS**

Approved by:  
 Department Chair: \_\_\_\_\_  
 College Curriculum Chair: \_\_\_\_\_  
 College Dean: \_\_\_\_\_  
 UGPC Chair: \_\_\_\_\_  
 Dean of the Graduate College: \_\_\_\_\_

Date:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Syllabus—must include all details as shown in the UGPC Guidelines.  
 Written Consent—required from all departments affected.  
 Go to: <http://graduate.fau.edu/gpc/> to download this form and guidelines to fill out the form.

Email this form and syllabus to [diamond@fau.edu](mailto:diamond@fau.edu) and [eqirjo@fau.edu](mailto:eqirjo@fau.edu) one week **before** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website by committee members prior to the meeting.

**Course name:** Methods in Hydrogeology

**Course number:** GLY6825

**Pre-requisites:** GLY4822-Hydrogeology or permission of instructor

**Instructor:** Dr. Tara L. Root

**Office number:** PS345

**Telephone:** (561)297-3253

**E-mail:** troot@fau.edu

**Office hours:** to be announced

**Classroom:** to be announced

**Required text:** There is no textbook required for this course. The below supplementary readings will be posted on , Blackboard. *A field book is required for this course.* Information about purchasing field books will be provided on the first day of class.

Bruckner, Monica. A Primer on Stable Isotopes and Some Common Uses in Hydrology.  
[http://serc.carleton.edu/microbelife/research\\_methods/environ\\_sampling/stableisotopes.html](http://serc.carleton.edu/microbelife/research_methods/environ_sampling/stableisotopes.html), last accessed 10/8/10.

EPA, 2001. A Citizen's Guide to Pump and Treat. U.S. Environmental Protection Agency, EPA 542-F-01-025.

Fitts, 2002. **Groundwater Science**. Academic Press, New York., pp. 30-36.

Ekwurzel, B., 2003. Dating Groundwater with Isotopes. *Southwest Hydrology*, 1:5, pp. 16-17.

Johnson, C.D. and Williams, J.H., 2003. Hydraulic logging methods – a summary and field demonstration in Conyers, Rockdale County, Georgia in ed. Williams, L.J., Methods used to assess the occurrence and availability of ground water in fractured-crystalline bedrock – an excursion into areas of Lithonia Gneiss in eastern metropolitan Atlanta Georgia: Georgia Geologic Survey, Guidebook 23, p. 40-47.

Kalbus, E, Reinstorf, F., Schirmer, M., 2006. Measuring Methods for Groundwater-Surface Water Interactions: A Review. *Hydrology and Earth System Sciences* 10:873-887

Nathanson, Lanzafama, and Kissam, 2006. **Surveying Fundamentals and Practices**, 5th Ed. Prentice Hall, pp. 129-160.

- Price, M. 1996. **Introducing Groundwater**, 2<sup>nd</sup> Edition. Chapman and Hall, London. pp. 3-12, 48-51.
- Saunders, L. 1998. **Manual of Field Hydrogeology**, Prentice Hall, New Jersey, pp. 17-29, 37-39, 199-216
- SAHRA, Isotopes and Hydrology, <http://www.sahra.arizona.edu/programs/isotopes/index.html>, last accessed 10/8/10.
- Weight, W.D., 2008. **Hydrogeology Field Manual**, 2<sup>nd</sup> Ed. McGraw-Hill. pp. 14-16.
- USGS, 1998. Advanced in Borehole Geophysics for Ground-Water Investigations. USGS Fact Sheet 002-98.
- USGS, 1999. Tracing and Dating Young Ground Water. USGS Fact Sheet 134-99.
- USGS, 2006. National Field Manual for the Collection of Water-Quality Data, Chapter A4. Collection of Water Samples. USGS Techniques of Water Resources Investigations Book 9.

#### **Bibliography:**

- Barcelona, M.J., Gibb, J.P., Helfrich, J.A., Garske, E.E., 1985. Practical Guide for Ground-Water Sampling. Illinois State Water Survey, SWS Contract Report 374.
- Brassington, R. 2007. **Field Hydrogeology (Geological Field Guide)**, 3<sup>rd</sup> Ed. Wiley-Interscience, 276 p.
- Carrier, D.W., 2003. Goodbye, Hazen; Hello, Kozeny-Carmen. *Journal of Geotechnical and Geoenvironmental Engineering*, 129:11, pp. 1054-1056.
- Clark, I.D., and Fritz, P., 1997. **Environmental Isotopes in Hydrogeology**. Lewis Publishers of CRC Press, 328 pp.
- Cronican, A.E., and Gribb, M.M., 2004. Literature Review: Equations for Predicting Hydraulic Conductivity Based on Grain-Size Data. *Ground Water*, 42:3, pp. 459 – 464.
- Delleur, J.W., 2007. **The Handbook of Groundwater Engineering**, 2<sup>nd</sup> ed. CRC Press, 1320 pp.
- Ekwurzel, B., 2003. Dating Groundwater with Isotopes. *Southwest Hydrology*, 1:5, pp. 16-17.
- Johnson, C.D., Haeni, F.P., Lane, W.L., Jr., and White, E.A., 2002. Borehole-Geophysical Investigation of the University of Connecticut Landfill, Storrs, Connecticut. U.S. Geological Survey Water Resources Investigations Report 01-4033.

- Johnson, C.D. and Williams, J.H., 2003. Hydraulic Logging Methods – A Summary and Field Demonstration in Conyers, Rockdale County, Georgia, in ed. Williams, L.J., Methods Used to Assess the Occurrence and Availability of Lithonia Gneiss in Eastern Metropolitan Atlanta, Georgia. Georgia Geologic Survey, Guidebook 23, pp. 40-47.
- Kalbus, E., Reinstorf, F., and Schirmer, M., 2006. Measuring Methods for Groundwater-Surface Water Interactions: A Review. *Hydrology and Earth System Sciences*, 10, pp. 873-887.
- Nathanson, Lanzafama, and Kissam, 2006. **Surveying Fundamentals and Practices**, 5th Ed. Prentice Hall, 502 pp.
- Odong, J., 2007. Evaluation of Empirical Formulae for Determination of Hydraulic Conductivity Based on Grain-Size Analysis. *Journal of American Science*, 3:3, pp. 54-60.
- Sanders, L., 1998. **Manual of Field Hydrogeology**. Prentice Hall, 381 p.
- Song, J., Chen, X., Cheng, D., Wang, D., Lackey, S., Zongxue, X., 2009. Feasibility of Grain-Size Analysis Methods For Determination of Vertical Hydraulic Conductivity of Streambeds. *Journal of Hydrology*, 375, pp. 428-437.
- U.S. Army, 1997. Military Soils Engineering, Chapter 4. Field Manual 5-410. Available on-line at <http://www.adtdl.army.mil/cgi-bin/atdl.dll/fm/5-410/toc.htm>.
- USGS, 1999. Tracing and Dating Young Ground Water. U.S. Geological Survey Fact Sheet 134-99.
- WDNR, 1996a. Groundwater Sampling Desk Reference. Wisconsin Department of Natural Resources, Bureau of Drinking Water and Groundwater, PUBL-DG-037 96.
- WDNR, 1996b. Groundwater Sampling Field Manual. Wisconsin Department of Natural Resources, Bureau of Drinking Water and Groundwater, PUBL-DG-038 96.
- Weight, W., 2008. **Hydrogeology Field Manual**, 2<sup>nd</sup> Ed. McGraw-Hill, 751 p.

**Course description and instructional objectives:** This course is designed to introduce students to practical aspects of hydrogeology, including project design, field methods, and data analysis.

- 1) Students will develop a working knowledge of the methods and concepts of practical hydrogeology.
- 2) Students will develop observational skills, data collection skills, and data analysis skills.
- 3) Students will gain hands-on experience with field work and data manipulation.

**Method of instruction:** The class will include lectures, field exercises, field trips, laboratory exercises, and computer exercises.

**Schedule including topics covered:**

Classroom Meetings		Field Sessions
<i>Week</i>	<i>Topic</i>	<i>Topic</i>
1	Course introduction Review of hydro	-
2	Site reconnaissance Field notes Surface water - groundwater interaction	-
3	Surface water gaging	-
4	Sediment sampling techniques Sediment descriptions	Seepage meters Sediment sampling and analysis
5	Grain size analysis K-estimation	-
6	Drilling techniques Well installation Hydrostratigraphic correlation	Drilling observation
7	Borehole geophysics	Borehole logging observation
8	Leveling Water level measurements	-
9	Water quality sampling and data analysis	Piezometer installation, water level measurements, leveling
10	Water quality continued	-
11	Groundwater remediation	Water quality sampling
12	Groundwater remediation continued	-
13	Pumping tests overview, design, data analysis	-
14	Pumping tests continued	-
15	Final exam	-

**Assessment procedures and dates and times of tests and quizzes:**

Graded components of the course include

- 1) Field notebooks: 50 points (Due on the day of the final exam)
- 2) Six projects: 50 points each for a total of 300 points (Due Week 3, Week 6, Week 8, Week 10, Week 13, and Week 15)
- 3) Final exam: 50 points (Week 15)

**Policy on make-up test and quizzes:** Unless arrangements have been made with me prior to the due date, the score on all late assignments will be decreased by 20% for every day beyond the due date. Assignments turned in more than 5 days late will receive a score of zero. If you miss the final exam, you will receive a score of zero unless you have made prior arrangements with me or have a verifiable personal emergency.

**Grading criteria:**

Total points possible: 400

Letter grades will be assigned as follows:

A	372-400	C	292-307
A-	360-371	C-	280-291
B+	348-359	D+	268-279
B	332-347	D	252-267
B-	320-331	D-	240-251
C+	308-319	F	less than 240

**Extra credit:** No extra credit will be given.

**Classroom etiquette:** No disruptive talking or disrespectful comments will be tolerated. Cell phones, beepers, watch alarms, etc. should be turned off prior to class.

**University “Students with disabilities” policy:** In compliance with the Americans with Disabilities Act (ADA), students who require special accommodation due to a disability to properly execute course work must register with the Office for Students with Disabilities (OSD) -- in Boca Raton, SU 133 (561-297-3880); in Davie, MOD 1 (954-236-1222); in Jupiter, SR 117 (561-799-8585); or at the Treasure Coast, CO 128 (772-873-3305) – and follow all OSD procedures.

**University “Honor code” statement:** Students at Florida Atlantic University are expected to maintain the highest ethical standards. Dishonesty is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. For further details see [http://www.fau.edu/regulations/chapter4/4.001\\_Code\\_of\\_Academic\\_Integrity.pdf](http://www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf), last accessed 10/8/10.

**From:** Pete Scarlatos (pscarlat@fau.edu)  
**To:** troot@fau.edu;  
**Date:** Mon, September 20, 2010 10:10:52 AM  
**Cc:** ivy@fau.edu; croberts@fau.edu;  
**Subject:** RE: New course proposals

Dr. Root,

After consultation with the CEGE faculty members, there is no conflict between our courses and those that you propose.

Good Luck,

*Pete S.*

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*Dr. Panagiotis (Pete) D. Scarlatos, Chair & Professor*  
*Department of Civil, Environmental and Geomatics Engineering (CEGE)*  
*College of Engineering and Computer Science*  
*Florida Atlantic University*  
*777 Glades Road, Engineering West (Bldg EG-36), Room 204*  
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**From:** Tara Root [mailto:troot@fau.edu]  
**Sent:** Friday, September 17, 2010 3:47 PM  
**To:** scarlatos@civil.fau.edu  
**Cc:** Russ Ivy; Charles Roberts  
**Subject:** New course proposals

Dr. Scarlatos,

I am going through the process of getting two new hydrogeology-related courses approved by the university. Since your department has some hydro-related interests, I thought I should check with you about any potential conflicts. The syllabi for the two courses, Benchmark Developments in Hydrogeology and Methods in Hydrogeology, are attached. Please let me know if your department has any conflicts with us offering these courses. And, if there are no conflicts, would you please send me an e-mail to that effect, which I can include with the course approval paperwork?

Thanks,  
Tara

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