

**APPLIED KARST HYDROGEOLOGY**  
**GEO 391 & GEO 371C**  
**Spring 2013**

**SYLLABUS (subject to revision)**

Course structure based 1 class meetings/week (**6:00-8:30 PM Tuesday**) plus 6 additional weekend projects. **Classroom: EPS 2.104**

Instructor: Marcus Gary (doc.mog@gmail.com)

TA: Jeff Senison (jeff.senison@gmail.com)

Prerequisites: GEO 476K (for 371C) and GEO 391C (for 391) or instructor's consent

Text: Methods in Karst Hydrogeology, Goldscheider, N. and Drew, D., 2007, 264 p.  
Available on Amazon.com

Maximum of 18 total students

Summary of Field Trips (*All required*):

1. **(Jan 26)** – Cave mapping/recharge vulnerability at Whirlpool Cave.
2. **(Feb 9-10)** – Gain-loss and tracer prep at Blanco River and Cypress Creek (camping in Wimberley area).
3. **(Feb 23)** – Dye Trace injection.
4. **(Mar 9-17)** – Optional field trip to west Texas
5. **(Mar 30)** – Synoptic water levels/Geochemistry; Edwards-Trinity system
6. **(April 5-7)** Hydrodays 2013 On Blanco River (camping at Jacob's Well).
7. **(April 20-21)** – Karst geophysics at Pleasant Valley Spring (camping in Wimberley area)

**Week 1 – Jan 15 - Course introduction** (*Chapter 1; p. 1-8*)

Lecture - Introduction to karst; course planning and logistics; term paper/project topics

**Week 2 – Jan 22 – Geologic controls of karstification I** (*Chapters 2 and 3; p. 9-44*)

Lecture – How caves/karst form (soluble matrix, fluid flow, dissolution kinetics...)  
Basics of Cave Survey

**Field Trip 1 (Jan 26) – Cave mapping/recharge vulnerability at Whirlpool Cave**

**Week 3 – Jan 29 – Geologic controls of karstification II; speleogenesis**

Lecture – Epigene, hypogene, eogene settings, features, processes

**Week 4 – Feb 5 – Karst aquifer recharge and discharge** (*Chapter 4; p. 45-64*)

Lecture – Mechanisms of discrete and diffuse recharge; karst springs

**Field Trip 2 (Feb 9-10) – Gain-loss and tracer prep at Blanco River and Cypress Creek (camping in Wimberley area).**

**Week 5 – Feb 12 – Groundwater tracing in karst** (*Chapter 8; p. 147-170*)  
Lecture – Dye tracing principles

**Week 6 – Feb 19 – Karst system evolution through geologic time**  
Lecture – Examples of multi-phase karst development

**Field Trip 3 (Feb 23) – Dye Trace injection at Blanco River.**

**Week 7 – Feb 26 – Case studies in karst research** (*Chapter 11; p. 223-228*)

**Week 8 – Mar 5 – Karst aquifers and reservoirs as natural resources** (*Chapter 5; p. 65-91*)

**Field Trip 4 (Mar 9-17) – Optional west Texas field trip.**

**Week 9 – Mar 12– Spring Break**

**Week 10 – Mar 19 – Karst geochemistry I** (*Chapter 6; p. 93-122*)  
Lecture – geochemical controls of various karst development settings.

**Week 11 – Mar. 26 – Karst geochemistry II** (*Chapter 7; p. 123-146*)  
Lecture – Isotopes in karst studies

**Field Trip 5 (Mar 30) – Synoptic water levels/Geochemistry; Edwards-Trinity system.**

**Week 12 – Apr. 2 – Karst geophysics I** (*Chapter 9; p. 171-200*)  
Lecture – Electrical resistivity

**Field Trip 6 (April 5-7) Hydrodays 2013 on Blanco (camping at Jacob's Well.**

**Week 13 – Apr. 9 – Karst geophysics II**  
Lecture – Microgravity, GPR, shallow seismic

**Week 14 – Apr. 16 – GW modeling in karst** (*Chapter 10; p. 201-222*)  
Lecture – Components of a good report

**Field Trip 7 (April 20-21) - Karst geophysics at Pleasant Valley Spring (camping in Wimberley area).**

**Week 15 – Apr. 23 – Project presentations**  
Lecture – overflow topic if needed

**Week 16 – Apr. 30 – Wrap up – project presentations**

## Grading

Field Project Data Reports:	35%
Term paper/presentation:	
Interpretative report:	35%
Presentation	10%
Annotated Bibliography	10%
Quizzes:	10%

**Field Project Data Reports:** During the semester, the class will perform 6 field projects. 3 students will be assigned as project leaders for each project, and will be responsible for preparing for the project, organizing all data and information collected, preparing a report jointly (among the 3 project leaders). The reports will be due on the class 2 weeks after completion of the field work (actually 16-17 days. For instance, Project one is completed on January 26, and the complete report will be due on February 12.

**Term paper/presentation:** Each student will individually prepare a term paper on an approved karst related topic. These topics can be related to the group field projects if wanted. For instance, if one was a project leader for Field Trip 1 (cave mapping), then they could research cave mapping applications as a term paper topic and combine some material from both reports. An oral presentation will be performed by each student on the topic of their term paper (10-15 min.)

**Annotated Bibliography:** There will be 1-2 papers assigned each week to read for the following class (in addition to the text book readings). Each student is also responsible to find another related paper on the topic of the assigned papers. These 2-3 papers should be summarized in a paragraph and turned in each week. At the end of the semester, students will be required to turn in a binder with all the papers read with the summary paragraphs, full citation, and copy of the paper. Must be digitally published as a single pdf document.

**Quizzes:** There will be 7 short quizzes given throughout the semester during class. The quizzes have 10 questions, and the top five answered will be counted in the grade.