

APPLIED KARST HYDROGEOLOGY

GEO 391 & GEO 371C

SYLLABUS (subject to revision)

Course structure based 2 class meetings/week (2:00-3:30 PM Tuesday - Thursday) plus 6 additional weekend projects. **Weekend** dates are *still tentative* and will be overlapped so as to compete minimally with GEO 420K.

Instructors: Marcus Gary and Jack Sharp

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

A maximum of 18 students for total enrollment.

Every other week we will also a review a paper from the current literature or a "classic" paper.

Week 1 - Course introduction

Lecture – Introduction to Karst

Lab – Visit local cave in Austin area – discuss karst development

Week 2 – Geologic controls of karstification I

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

Lab – Lab dissolution of limestone

Week 3 – Geologic controls of karstification II (Speleogenesis)

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

Lab – Cave survey and mapping (map GEO building as if cave)

Field Trip 1 – Cave mapping/geological mapping in local Austin caves.

Week 4 – Karst aquifers and reservoirs as natural resources

Lecture – Overview of karst aquifers and reservoirs in region, country, and globally;

Porosity/permeability-heterogeneous/anisotropic properties.

Lab – Potentiometric surface mapping in karst (e-line, pressure transducers in lab)

Week 5 — Karst aquifer recharge and discharge

Lecture – Mechanisms of discrete and diffuse recharge; karst springs

Lab – Discharge measurements in Waller Creek

Field Trip 2 – Install water well network in northern Edwards and Barton Springs Edwards

Week 6 – Advanced methods in karst surveying

Lecture – Sonar, Lidar, etc. - methods and applications

Lab – Laser scanner in geo building

Week 7 – Identification of recharge features

Lecture – Methods of land surface karst survey; types and sensitivity of features

Lab – Karst survey at Austin area property (CoA with Nico Hauwert)

Field Trip 3 – Karst feature/geology mapping at Camp Bullis

Week 8 – Karst system evolution through geologic time

Lecture – Examples of multi-phase karst development

Lab – no lab (optional week-long field trip)

Week 9 – Spring Break (optional field trip to west Texas caves)

Week 10 – Groundwater tracing in karst

Lecture – Dye tracing principles

Lab – Dye trace in Waller Creek

Field Trip 4 – Dye tracing at Coma Springs with EAA

Week 11 – Karst geochemistry I

Lecture – geochemical controls of various karst development settings.

Lab – Geochemical measurements of karst waters (Barton Springs system)

Week 12 – Apr. 4 – Karst geochemistry II

Lecture – Isotopes in karst studies

Lab – Speleothems

Field Trip 5 – Groundwater geochemistry (wells and springs) – collect pressure transducers

Week 13 – Karst geophysics I

Lecture – Overview of geophysical methods used in karst

Lab – Electrical resistivity and gravimetry demonstration

Week 14 – Karst geophysics II

Lecture – Case studies in karst geophysics

Lab – Prepare for final project

Field Trip 6 - Integrated karst project at Camp Bullis (camping in S.A. area)

Week 15 – Report writing I

Lecture – Components of a good report

Lab – generating maps/reports

Field trip 7 - Optional field trip to Karst Interest Group and Hydro Days meeting in Fayetteville, Arkansas

Week 16 – Wrap up

Lecture – Q/A

Lab – Final exam

Substitution field projects (may substitute for one or more of the above):

- 1. Stream gauging of losing streams on the Edwards Aquifer recharge zone.**
- 2. Gravity and Total station survey of Flint Ridge Cave.**

Grading

Field maps and reports: 70%

Paper reviews: 10%

Final Exam: 20%

Classroom: EPS 2S.104