

Spring 2018
GEOL 4383 (CRN 27749)
GEOL 5317 (CRN 27750)
General Hydrogeology

INSTRUCTOR

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MEETING PATTERN & LOCATION

TR, 12:00-1:20 pm (3 credits), Geology Building 320

COURSE DESCRIPTION

The overall objective of this course is to provide an introduction to the basic principles of the hydrologic cycle and groundwater flow. The course will emphasize flow in confined and unconfined aquifer, pump test design and analysis, the transport of contaminants and the use of computer models to simulate saturated groundwater flow. We will also perform simple experiments to better understand the concepts of groundwater flows and pump tests. Case studies for groundwater contamination and remediation will be also discussed.

COURSE OBJECTIVES

- 1) Learn the Darcy's law, which describes how water flows through a porous media.
- 2) Understand the main equations of flow, which are conservation statements for steady-state and transient conditions
- 3) Study the hydraulic testing methods, primarily pumping tests, which are used to determine the hydraulic properties of a water-bearing rock unit.
- 4) Learn the principles of aqueous geochemistry that pertains to groundwater systems.
- 5) Learn the concepts in contaminant hydrogeology including transport phenomena and remediation.
- 6) Practice and learn basic numerical modeling schemes for groundwater problems

REQUIRED TEXTBOOK

Applied Hydrogeology, by Fetter, C.W., 4th ed., Prince Hall, Upper Saddle River, NJ.
Hydrogeology Laboratory Manual (provided in class), by Lee, K., Fetter, C.W., and McCray, J.E.

RECOMMENDED READINGS

Groundwater, by Freeze, R.A. and Cherry, J.A., 1979, Prentice Hall, Inc., Upper Saddle River, NJ.
Hydraulics of Groundwater, by Bear, J., 1979, Dover Publications, Inc., Mineola, NY
Contaminant Hydrogeology, by Fetter, C.W., 2nd ed., Waveland Press, Inc., Long Grove, IL

TENTATIVE SCHEDULE OF TOPICS – *subject to change!*

Week	Topics	Reading assignments
1	Introduction and Hydrologic cycle	T1-18, 93-99
2	Evapotranspiration and Rainfall	24-37 and Handout
3	Rainfall-Runoff and Vadose Zone	37-55, 219-231
4	Hydrologic equations and water budget	Handout
5	Darcy's law, generalization to multiple dimensions, aquifer properties	T90-93, 113-125, 66-90, handout
6	Confined and unconfined aquifers	T125-129, 138-139, 140-146
7	Application to confined and unconfined aquifers	Handout
8	Flownets, Midterm review, Midterm	T132-138, handout
9	Radial flow and applications	T150-165, handout
10	Superposition and Pump tests	T166-184, 184-190
11	Slug tests and applications	T190-209, handout
12	Analytical solutions and applications	Handout
13	Introduction to Groundwater numerical modeling	T426-435, 436-439
14	Modeling exercise: Case study: groundwater contaminant	Handout
15	Modeling exercise: Pump and treat remediation, capture zones, review for final exam	T283-322, 514-530,