

Department of Civil and Environmental Engineering
Course Description and Outline

CE 618 – Applied Hydrogeology
Mondays, 6:00-9:00 pm

Fall 2017
Dr. John Schuring

Prerequisites: Undergraduate course in fluid mechanics.

Course Objective:

The course examines ground water movement through the subsurface environment. A basic understanding of the aquifer geology is emphasized. Hydrogeologic applications are presented including well design, pumping tests, construction dewatering, hydrogeologic hazards, and computer modeling of subsurface flow and transport. Methods to monitor and remediate contaminated groundwater are introduced.

Course Texts:

The principal text is:

A: Fetter, C.W., *Applied Hydrogeology*, 4th Ed., Prentice Hall, 2001.

In addition, the reference texts listed below are recommended for further study.

Reference Texts:

B: Domenico, P.A. and Schwartz, F.W., *Physical and Chemical Hydrogeology*, 2nd Ed., John Wiley, 1998.

C: Heath, R.C., *Basic Ground-Water Hydrology*, Water Supply Paper 2220, U.S. Geological Survey, revised 2004.

D: Driscoll, F.G., *Groundwater and Wells*, Second Edition, Johnson Systems, 1986.

E: Freeze, R.A. and Cherry, J.A., *Groundwater*, Prentice Hall, 1979.

F: Bear, J. and Verruijt, A., *Modeling Groundwater Flow and Pollution*, Reidel, 1987.

Course Format: Most classes will be a lecture format supplemented with interpretative exercises in the CEE Hydraulic and Hydrogeology Laboratory and the CEE Computing Laboratory. Homework problems will be assigned throughout the course. A computer project will also be required using provided software. Two exams will be given including a midterm and a final.

***Honor Code:** Students are advised that the NJIT Honor Code will be upheld in this course, and any violations will be brought to the immediate attention of the Dean of Students.

Course Grading Basis: Homework and Computer Assignments = 50%; Midterm Exam = 25%; Final Exam: 25%.

Instructor Contact: Colton Hall, Room 225; Ph: 973-596-5849; Fax: 973-596-5790; schuring@njit.edu. Office hours: Mon. 4:00-5:00, Thurs. 11:00-1:00; other hours by appointment.

Course Syllabus: *Please see next page.* Students will be consulted on any substantial changes to the course syllabus. Changes will be announced in advance.

COURSE OUTLINE – CE 618

Week	Date	Topics	Reading (Text A: Fetter)	Assignments
1	Sept. 11	Introduction; Groundwater Occurrence; Aquifers and Aquifer Properties; Groundwater Budgets	1.1-1.12; 3.1-3.11; 11.1-11.5	HW 1
2	Sept. 18	Darcy's Law; GW Flow and Potentiometric Surface; Interstitial Velocity; Steady State Well Hydraulics	3.12; 4.1-4.14; 5.1-5.4; Handouts	
3	Sept. 25	Unconsolidated Aquifer Geology; Alluvial and Glacial Deposits; <i>Aquifer Properties Lab</i>	8.1-8.2; Handouts	HW 2
4	Oct. 2	Consolidated Aquifer Geology: Sedimentary, Igneous, and Metamorphic Formations; Ground Water Regions of U.S.; Ground Water Indicators (Geobotany); Well Siting	8.3-8.4; 8.10; Handouts	(HW 1 due)
5	Oct. 9	Non-Steady State Well Hydraulics	5.5	HW 3 (HW 2 due)
6	Oct. 16	Well Drilling, Design, and Testing; Slug Tests; Cones of Influence	5.6-5.10; Handouts	
7	Oct. 23	Flow Nets; Critical Gradient; Quick Conditions; Construction Dewatering	4.11-4.12; Handouts	HW 4 (HW 3 due)
8	Oct. 30	Midterm Exam		
9	Nov. 6	Wetlands Delineation; Hydrogeological Hazards: Subsidence, Salt Water Intrusion, and Karst	8.3.4; 8.7-8.8; Handouts	
10	Nov. 13	Groundwater Modeling Theory; Unsaturated Systems	Chap 13; Chap 6;	HW 5 (HW 4 due)
11	Nov. 20	Groundwater Modeling: Computer Analysis	<i>AQTESOLV</i>	
12	Nov. 27	Groundwater Modeling: Computer Analysis	<i>GMS MODFLOW</i>	
13	Dec. 4	Groundwater Quality and Contamination	10.1-10.7	
14	Dec. 11	Groundwater Remediation	10.8-10.9	(HW 5 due)
15	Dec. 18	Final Exam		