Ground Water Hydrology
CVEG 5243

Instructor: Thomas Soerens
Office: Bell 4149
phone: 575-2494
e-mail: tsoerens@uark.edu

Text: Ground Water Contamination, Transport, and Remediation, Bedient, Rifai, and Newell, Prentice Hall, 2nd ed., 1999.

Objectives: To learn the principles of ground water flow, subsurface transport and fate processes, and their application to remediation technologies.

Grading:

Homework and quizzes	26%	90 - 100	A
Exams (3)	54%	80 - 89	B
Term paper	20%	70 - 79	C
	100%	60 - 69	D
		below 60	F

Homework: Homework assignments will be due at the beginning of class. No late homework will be accepted. Homework should be legible and presentable. Students may consult each other but are expected to turn in individual work, except for the projects explicitly defined as group projects.

Exams: Three exams will be given during the semester. The dates, material covered, and format (e.g., open/closed notes) will be announced in class at least one week in advance.

Term Paper: Each student will write and present a paper on a ground water topic. Possible topics include: simple drilling methods, selection of well pumps, treatment methods for iron or arsenic, unsaturated/karst flow, and various remediation methods.

Course Schedule

	lecture	***Topics***	Text Ch.	Homework
Week 1	1	Intro, definitions, hydrostatics	1	
	2	Ground water media properties	2	HW #1
	3	Ground water flow – Darcy's Law		
Week 2	4	Ground water hydrology		HW #2
	5	Well hydraulics	3	HW #3
	6	Well hydraulics		
Week 3		**Exam 1**		
	7	Aquifer tests	Notes	HW #4
				Project topic due
	8	Aquifer tests		
Week 4	9	Sources of Contamination	4	HW #5
	10	Hydrogeologic site investigations	5	
		Exam 2		
Week 5	11	Contaminant transport	6	HW #6
	12	Contaminant transport		
	13	Contaminant fate	7	HW #7
Week 6	14	Contaminant fate		
				Project abstract due
	15	NAPLs	11	
	16	Remediation	13	
Week 7		**Exam 3**		
	17	Advanced topics/Applications		
	18	Student presentations		
Week 8	19	Student presentations		**Project paper due**
	20	Student presentations		

Course Outcomes: By the end of this course, the student should be able to:

1. Use Darcy's law to relate ground water velocity, head loss, and hydraulic conductivity.
2. Calculate porosity, bulk density, and solid density from soil volume and weight.
3. Use steady-state well equations to relate drawdown, transmissivity or hydraulic conductivity, flow rate, and radial distance from the well.
4. Use image wells to calculate boundary effects.
5. Use the Theis method of curve-matching to calculate aquifer properties.
6. Use the Cooper-Jacob method to calculate aquifer properties.
7. Determine hydraulic conductivity from a slug test.
8. Create a conceptual model of a ground water contamination site.
9. Describe the fundamental mechanisms of unsaturated and karst flow.
10. Calculate sorption effects by relating k_d, f_{oc}, k_{oc}, and R.
11. Calculate a degradation rate constant from concentration data.
12. Calculate the mass of contaminant in the soil, water, air, and NAPL phases.
13. List and describe remediation technologies.