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GEOL 572.01: Advanced Hydrogeology

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Geol. 572 Advanced Hydrogeology

Spring 2002

Instructor: William Woessner

Text: Groundwater and Wells (Driscoll)
Contaminant Transport (Fetter)
Outside readings as assigned (list attached)

Class Meeting: T, TH 8:00-9:30 A.M.

Course Objectives:

Develop advanced theoretical and applied hydrogeologic skills, specifically in solute transport processes, interpretation of water level change, production well design and aquifer test analyses.

Course Assessment:

Completion of all assignments in a professional manner
Active class participation
Grading of assignments

Course Design:

Readings and lectures, problems sets, research paper, midterm and final exam

Course Requirements:

Complete readings
Actively participate in class discussions
Complete all assignments in a professional manner
10 page term paper on a research topic
Grading: Problem Sets 55%, Midterm 25%, Individual Report: Oral 5%, Written 15%, Final 25%.

Final Exam: Friday, May 17, 8:00-10:00 A.M.

All Assignments will be due on dates specified in class.

GEOLOGY 572 - ADVANCED HYDROGEOLOGY
WILLIAM W. WOESSNER - SPRING 2002

DATE	TOPIC	READING
January 29 February 31	Intro - Solute Transport Solute transport	Fetter, Ch. 1 Ch. 2-2.6
February 5 February 7	Solute Transport Solute Transport	Fetter
February 12 February 14	Solute Transport Solute Transport	Fetter
February 15	LAST DAY TO ADD/DROP BY CYBERBEAR	
February 19 February 21	Solute Transport Solute Transport	Fetter
February 26 February 28	Solute Transport Solute Transport	Fetter
March 5 March 6	Well Drilling Techniques Well Drilling Techniques	Driscoll
March 11	DROP/ADDS (NO \$\$\$ BACK)	
March 12 March 13	Production Well Design Production Well Design	Driscoll
March 18-20	SPRING BREAK	
March 26 March 28	Production Well Production Well Design	Driscoll
April 2 April 4	Production Well Aquifer Test	Lohman
April 9 April 11	Aquifer Test Aquifer Test	Lohman
April 16 April 18	Aquifer Test Aquifer Test	Lohman
April 23 April 25	Aquifer Test Aquifer Test	Lohman
April 30 May 2	Paper Presentations	
May 7 May 9	Review Finish Up	

GEOLOGY 572 - ADVANCED HYDROGEOLOGY
MATERIAL WILL BE PLACED ON RESERVE AS REQUESTED

WELL DESIGN AND EVALUATION

Williams, 1981, Fundamental Concepts of Well Design

Clark and Turner, 1983, Experiments to Assess the Hydraulic Efficiency of Well Screens

Williams, 1981, The Well/Aquifer Model

Schafer, 1978, Casing Storage Can Affect Pumping Test Data

Harrill, 1970, Determining Transmissivity from Water-level Recovery of a Step-drawdown Test

Nahm, 1980, Estimating Transmissivity and Well Loss Constant Using Multi-rate Test Data from a Pumped Well

Turcan, 1962, Estimating the Specific Capacity of a Well

AQUIFER TESTING

Reed, 1980, Type curves for Selected Problems of Flow to Wells in Confined Aquifers

Neuman, and Witherspoon, 1969, Applicability of Current Theories of Flow in Leaky Aquifers

Jacob and Lohman, 1952, Non-steady Flow to a Well of Constant Drawdown in an Extensive Aquifer.

Theis, 1935, The Relation Between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Ground-water Storage.

Boulton, 1954, The Drawdown of the Water-table Under Non-steady Conditions Near a Pumped Well in an Unconfined Formation.

Walton, 1978, Comprehensive Analysis of Water-table Aquifer Test Data.

Jacob, 1940, On the flow of Water in an Elastic Artesian Aquifer.

Papadopoulos and Cooper, 1967, Drawdown in a Well of Large diameter.

WATER LEVEL FLUCTUATIONS

Turk, 1975, Diurnal Fluctuations of Water-tables Induced by Atmospheric Pressure Changes.

Meyboom, 1967, Groundwater Studies in the Assiniboine River Drainage Basin.

Freeze, 1969, The Mechanism of Natural Ground-water Recharge and Discharge.

SOLUTE TRANSPORT

Sauty, 1980, An analysis of Hydrodispersive Transfer in Aquifers.

Garabedian et al, 1991, Large Scale Natural Gradient Tracer Test in Sand and Gravel, Cape Cod, Massachusetts.

Wheatcraft and Tyler, 1988, An Explanation of Scale-Dependent Dispersivity in Heterogeneous Aquifers Using Concepts of Fractal Geometry.

Gelhar, 1986, Stochastic Subsurface Hydrology from Theory to Applications

Anderson, Movement of Contaminants in Groundwater.

Bahr, 1992, Groundwater Transport of Contaminants.

Cherry et al, Contaminants in Groundwater Chemical Processes.

Cherry et al, Contaminant Hydrogeology Part 1, Physical Processes.

Domenico and Robbins, 1984, A Dispersion Scale Effect in Model Calibrations and Field Tracer Experiments.

Gillham and Cherry, 1982, Contaminant migration in Saturated Unconsolidated Geologic Deposits.

Lehr, 1988, An Irreverent View of Contaminant Dispersion.

Sudicky, 1986, A Natural Gradient Experiment on Solute Transport in a Sand Aquifer.

Robertson et al, 1989, Groundwater Contamination at Two Small Septic Systems on Sand Aquifers.

POSSIBLE RESEARCH PAPER TOPICS

1. Hydrogeology of river floodplains and streams
2. Fractal approaches to solute transport modeling
3. Scale dependent representation of dispersivity
4. DNAPL behavior in the saturated zone
5. The use and interpretation of ground penetrating radar and seismic reflection in groundwater studies
6. Depositional environments of high hydraulic conductivity aquifers

7. Transport of colloids in groundwater