

**WELCOME TO:
Ground Water Engineering GEGN466**

Eileen Poeter inside.mines.edu/~epoeter

Schedule, Notes and Other Materials Posted:

inside.mines.edu/~epoeter/466/

Look at it now --- WATCH FOR UPDATES!

inside.mines.edu/~epoeter/OfficeHours.htm

MON and WED 10-10:45

Any Time: epoeter@mines.edu

Supporting Materials:

* **Applied Hydrogeology, 4th Edition**

* **Internet**

* **Computers for use on class notes and exercises**

please do not surf or email during class

**GROUND-WATER ENGINEERING
GEOHYDROLOGY HYDROGEOLOGY
GROUNDWATER-HYDROLOGY**

The Study of the Occurrence, Nature, Distribution, and
Movement of Groundwater. Engineering "Controls" those.

"Nature, to be commanded, must be obeyed" Francis Bacon

GEOHYDROLOGISTS

Are Problem Solvers and Decision Makers

BASIC TASKS:

Identify Problem

Define Data Needs

Design/Conduct Study

Propose Alternative Solutions

Implement Preferred Solution

GENERAL PROBLEMS:

Water Supply

Waste Disposal

Environmental Planning

Construction

Solution Mining

TYPES OF EMPLOYERS:

GOVERNMENT

INDUSTRY

RESEARCH

CONSULTING

FORMAT

Recent Educational research has shown that **ACTIVE LEARNING** is the most **Effective technique for understanding and retaining** topic material

It is best to **cover less material, but understand it** (and associated implications and problems) better.

Your **instructor is a guide and a resource, not a "talking head"**. Studies have shown that "talking heads" (i.e. a lecturing professor) do not promote effective learning.

Other studies have shown that **interaction with other students enhances the learning** of all students.

**The material for this class is
not difficult for a CSM student**

**TO LEARN, YOU MUST PARTICIPATE
with GENUINE INTEREST.**

**One does not fully grasp concepts
until they use them.**

Confucius:

**"I hear and I forget,
I see and I remember,
I do and I understand."**

Participation

means that you **review the class materials after each class** and make calculations (i.e. you **DO!**) as you explore the material.

Many materials are available to help you with this:

CLASS EXERCISES & SOLUTIONS course web pages

EXAM PROBLEMS FROM PREVIOUS YEARS & SOLUTIONS course web pages

TEXT PROBLEMS & SOLUTION MANUAL (ed4) on reserve in library

Whenever you have trouble understanding concepts you can contact me at: office hours, by phone-mail, fax, or by email. Email is the most effective and the most quickly answered.

Class discussion is welcome at any time, as are questions pertinent to the subject matter. Sometimes the best lectures are those impromptu expositions that stem from your questions.

Participation is a must ... this includes attendance, asking & answering questions, engagement in the demonstrations, involvement in the class exercises, working problems on your own, and working with your classmates.

Let's take a minute for a photo
so I can learn who you are

Exams

SEE EXPECTATIONS on Course web page

There will be **3 exams, 2 during the semester and a final.**

Subject matter is Cumulative

A calculator is a necessity during exams

You may bring 3 pieces of paper with you to the exam with as much written on them as you wish, both sides, small print etc.

(you can bring 3 new sheets to each exam + the sheets from the previous exam)

Creating such a sheet helps you study and provides the equivalent of an “open-book” exam without spending too much time paging through the book.

GRADING:

Homework	20%
Best of Exam I / II	40%
Final Exam	40%
TOTAL	100%

Homework must be turned in at the next class period unless I note differently. It must go in the HW box by the classroom door. Late homework will not be evaluated. Homework key will be posted by the day that the homework is returned.

If you miss one of the exams (I or II), the other exam is used for your exam score (NO MAKE UP EXAMS).

If you miss the final, I offer a more challenging final during the last 2 hrs before formal recess for semester break.

**In the event of H1N1 flu symptoms <http://inside.mines.edu/Flu>
USE the STUDENT SELF-REPORT and we will work something out**

DEVELOPMENT OF GROUNDWATER THEORY

Ancient Philosophy

Springs - gifts of gods / sites of temples

All thought earth too impermeable and rainfall too little to supply rivers

Water was thought to be sucked up from the earth to supply rivers

1600's Perrault & Mariotte - Measured rainfall and estimated discharge from Seine, found it was only 1/6 of rainfall

Perrault - Capillary experiments (<1m rise in sand)

Mariotte - Measured seepage in cellar, found it varied proportionally with rainfall.

Concluded springs fed by infiltration

Halley - Crude evaporation tests in Mediterranean indicated evaporation was high enough to account for all water flowing to the sea

**GENERAL CONCLUSION - EARTH IS LIKE A SPONGE
AS WE KNOW TODAY, GROUNDWATER IS EVERYWHERE,
IT MAY NOT YIELD TO WELLS,
BUT IT DOES NOT FLOW IN UNDERGROUND PIPES AND RIVERS!**

DARCY first to state the **simple law describing groundwater flow in 1856**

Elaboration on Relation of Geology & Occurrence of Groundwater

Development of Equations & Solutions to Describe Groundwater Flow

Study of Geothermal Activity

Study of Hydrochemistry & Water/rock Interaction

Awareness, Detection, and Remediation of Contaminated GW