

WELCOME TO:
Ground Water Engineering GEGN467
 Eileen Poeter inside.mines.edu/~epoeter
 Schedule Notes and Other Materials Posted:
inside.mines.edu/~epoeter/467/
 Let's Look Now --- **WATCH FOR UPDATES!**
inside.mines.edu/~epoeter/OfficeHours.htm
 MON and WED 10-10:45
 Any Time: epoeter@mines.edu
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Supporting Materials:

- * **Applied Hydrogeology, 4th Edition**
 - * **Hydrogeology Laboratory Manual, 2nd Edition**
 - * **Internet**
 - * **Computers for use on class 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, working with your classmates, and staying to work in the lab.

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	10%
Lab	30%
Best of Exam I / II	30%
Final Exam	30%
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**

Labs are due at the start of the next lab period unless an alternate time is specified. Grades on late lab work decrease 50% per day, so turning it in more than 24 hours late is only useful for getting feedback, not for earning class points. Therefore! plan to complete your lab early so you aren't caught with an unfinished lab if it turns out that you are not feeling well or some other crisis occurs the day or so before the lab is due.

LABS

Unless otherwise announced, labs are turned in at the start of the lab period the week following each assignment. Labs turned in later in that period until 12:30 Thursday are 1 day late and will have the score reduced by 50%. Labs turned in after that time will receive feedback but will not earn credit.

TEXT for the labs should be word processed but hand written calculations, graphs, data etc are appropriate as long as they are NEAT.

In your reporting, illustrate the tenets of engineering practice:
neat, accurate, concise.

Fundamental Canons for Engineers

- * hold paramount public **safety, health and welfare** including sustainable development
- * perform **services** only in **areas of competence**
- * issue **public statements** only in an **objective truthful** manner
- * act as **faithful** agent or trustee for **employer**
- * **avoid conflicts of interest**
- * build professional reputation on merit (**do not compete unfairly**)
- * uphold and enhance **honor, integrity, and dignity** of the engineering profession
- * **continue professional development** throughout career and provide opportunities for the professional development of engineers under supervision

http://inside.mines.edu/~epoeter/_GW/ASCE_CodeofEthics.pdf

Colorado School of Mines Academic Integrity and Code of Conduct

The faculty, administration and students of the Colorado School of Mines support the principle that all individuals associated with the academic community at CSM have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity at Mines.

The protection of academic integrity requires clear and consistent standards and definitions, as well as confrontation and sanctions when individuals intentionally violate those standards. The most important of the definitions is that of academic dishonesty – the intentional act of fraud. Academic dishonesty also includes, but is not limited to, forgery of academic documents, intentionally impeding or damaging the academic work of others, or assisting others in acts of academic dishonesty. Some examples of specific acts of academic dishonesty include, but are not limited to:

1. Plagiarism
2. Intentionally using or attempting to use unauthorized materials, information materials, information or study aids in any academic exercise.
3. Taking material from the library that is there for the use of all students and is not to be removed without permission.
4. Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty.
5. Unauthorized use of another's computer program, disk, tape or email.

At the Colorado School of Mines, students who observe or are aware of an incident of apparent academic dishonesty must report the matter to a faculty member, the appropriate head or the Vice President for Student Life/Dean of Students. The information is then provided to the faculty member concerned. The faculty member may personally determine whether academic dishonesty has occurred, confront the student(s) with the charge and, if guilt is admitted, impose a sanction. If, after confrontation, the student does not admit to committing the offense, the charges and evidence is submitted to the Vice President for resolution. In most cases, substantiated charges of academic dishonesty will result in a grade of F in the course. The presumptive disciplinary action in serious instances or second offenses is suspension and a notation of same on the student's transcript.

Students charged with academic dishonesty must be afforded a fair opportunity for a defense. Upon notification of a finding of academic dishonesty and the associated penalties, the student may appeal the Vice President's decision, in writing. An appropriate committee will be formed to hear the appeal.

Enrollment at the Colorado School of Mines is an optional and voluntary entrance into an academic community. Therefore a student voluntarily assumes obligations of academic performance and personal behavior required by the school. These obligations are more general than those imposed on all citizens by civil and criminal laws. Examples of specific violations that may result in disciplinary action include but are not limited to:

1. Intentional obstruction or disruption of any university or university authorized activity.
2. Theft of or alteration to property of the Colorado School of Mines or to property of a member of the university community.
3. Dishonesty including knowingly furnishing false information to the university.
4. Violation of any published Colorado School of Mines policy or campus regulation, including use of university facilities.
5. Any other conduct not included above, which adversely affects the functions of the Colorado School of Mines and pursuit of its educational purposes and objectives.

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