

**Colorado State University**  
**Department of Civil and Environmental Engineering**  
**Spring 2015**  
**CIVE 423 – Groundwater Engineering**



**Instructor:** Dr. Ryan Bailey  
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Office phone: 491-5045  
Office location: Engineering A209  
Office hours: T-Th 11:00 – 12:00

Class Time: MWF 2:00 – 3:00 pm  
Class Location: Engineering E106

**Class Website:** <https://ramct.colostate.edu/> The RamCT website will be used to post homework assignments, additional instructional material, announcements, etc.

**Required Text:** Fitts, C.R. (2012), Groundwater Science, 2<sup>nd</sup> edition, 672 p. Academic Press (Elsevier), Amsterdam.

*Lecture material and homework problems will be supplemented from other textbooks and source material.*

**Prerequisites:** CIVE 300 or CBE 331 or WR 416

**Course Description:** Development of groundwater resources; origin, movement, distribution of water below groundwater surface; water quality; remediation.

**Objectives:** Familiarize students with concepts, terminology, chemistry, and math skills required to solve basic groundwater problems.

**Topics Covered:**

- Overview of groundwater distribution and use (historical and current)
- Storage and transmission of groundwater
- Groundwater interaction with surrounding environment
- Estimating aquifer parameters
- Analytical and Numerical Modeling
- Groundwater system design
- Groundwater quality and remediation

*Course Syllabus*  
*Fall 2013 – CIVE 260 – Engineering Mechanics - Statics*

**Teaching Philosophy:** The successful completion of this course requires your attention, hard work, and respect. In return, I will strive to create a classroom setting that encourages learning, critical thinking, and respect for all students. I will endeavor to meet your academic needs, and as such encourage all students to take advantage of the weekly office hours. **I enjoy helping students outside of the classroom.** However, please be respectful of my time, as I have other duties to perform within the department.

**Academic Integrity:** Academic dishonesty is extremely serious. University rules, including academic penalty and further investigation by the university authorities, will be strictly enforced in this course. Please review the CSU Student Code for details regarding these rules. I know that solution manuals are available for most textbooks on the internet. Copying from them not only will prevent you from learning, and thereby result in lower exam scores, but also may lead to dismissal from the course.

**Reading:** You are expected to come to each lecture having read the assigned material in the textbook. Reading assignments from sources other than the textbook also will be assigned periodically.

**Homework:**

- Homework sets will be assigned most weeks on Friday, due at the start of class the following Friday. Late homework will be accepted, although the score will be decreased by 25% of the total possible points for each day that the assignment is late.
- Homework assignments shall be typed or neatly hand-written on engineering paper. Solution development shall be shown in a step-by-step manner. Partial credit will be given. Students can collaborate on homework sets but each student must write and submit their own homework. Copying is not allowed!
- See attached sheet for formatting guidelines (points will be taken off for failing to meet these guidelines)

**Field Labs:**

- There will be 2-3 field labs during the semester. These likely will take place at the GetWET observatory (<http://getwet.colostate.edu/>) (just south of the Hilton along Spring Creek).
- These labs will provide hands-on experience to estimate aquifer parameters and take groundwater sampling for water quality analysis. More information (timing, logistics) will be provided as the semester progresses.

**Exams:**

- Exams consist of two in-class mid-terms and a final (scheduled for Tuesday, May 12 at 7:30 am). Closed book, with 1 sheet (front and back) of notes and equations.
- Exams will consist of both non-quantitative (i.e. short answer) and quantitative sections, and will cover material from lectures, homework, and field labs.
- The only calculator models acceptable for use during exams are Casio fx-115 models, HP 33s and 35s, TI-30X and TI-36X models.

**Makeup exam policy:** For students who cannot attend regular exams due to university business duty, serious illness, or family emergency (all with written proof), a makeup exam may be arranged AFTER the regular exam. The instructor must be notified prior to the exam, and no exceptions will be made without a legitimate reason and a timely arrangement.

*Course Syllabus*  
*Fall 2013 – CIVE 260 – Engineering Mechanics - Statics*

**Course Grading:**

The grading breakdown is as follows:

- Homework 35%
- Field Labs 5%
- Exams (3) (1) 20% , (2) 20%, (Final) 20%

Term grades for this course will use the  $\pm$  grading system as described in the CSU catalog. Grades will be assigned according to the following range:

90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
< 60%	F

This range will not be shifted up. However, it may be shifted down based on relative difficulty of homework exercises and exams. If, at the end of the semester, a student's score is 0.5% from a higher grade, then that student will receive the higher grade *if* the student's semester homework score is higher than the student's overall semester score.

**Tentative Weekly Schedule**

Week	Topic	Homework Assigned	Field Labs	Exams	Readings
1/21/2015	Introduction to Groundwater	HW 1			1.1 - 1.7
1/26/2015	Groundwater Storage	HW 2			2.1-2.6; 6.1,6.2,6.7,6.8
2/2/2015	Groundwater Transmission	HW 3			3.1-3.11; 5.1.3
2/9/2015	Analytical Modeling	HW 4			6.9-6.10; 7.2,7.3,7.5
2/16/2015	Interactions with Environment	HW 5			5.2.1-5.2.6; 8.3
2/23/2015	Interactions / Aquifer Parameters			2/27 Exam #1	4.1-4.3
3/2/2015	Estimating Aquifer Parameters	HW 6	Lab #1		8.2,8.3,8.5
3/9/2015	Estimating Aquifer Parameters	HW 7	Lab #2		8.6
3/16/2015	SPRING RECESS				
3/23/2015	Hydrology Days / Design				-
3/30/2015	Groundwater System Design	HW 8			-
4/6/2015	Groundwater Modeling	HW 9		4/10 Exam #2	9.1-9.3, 9.6
4/13/2015	Groundwater Modeling	HW 10			9.4
4/20/2015	Groundwater Quality	HW 11	Lab #3		10.1-10.6,10.9; 11.1-11.6
4/27/2015	Groundwater Quality	HW 12			11.7-11.9
5/4/2015	Special Topics				
5/12/2015	Final Exam			7:30 AM	