

University of Colorado Denver  
Department of Civil Engineering and Construction  
**CVEN-5334 Groundwater Hydrology**

**Fall 2025**

Lecture: Mon/Wed 5:00-6:15 pm

Location: North Classroom 1521

Office Hours: Mon/Wed 3:30-4:45 pm,  
and by appointment

Instructor: David C. Mays, P.E., Ph.D.

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<http://engineering.ucdenver.edu/dmays/5334>

**Catalog Description:** Topics include groundwater occurrence, hydrologic cycle and budget, interactions with surface waters, principles of groundwater flow, well hydraulics, well field design, regional flow systems, water and pollutant chemistry, computer modeling and groundwater management. Emphasis is on quantitative analysis methods for groundwater resource inventory, design, and management.

**Prerequisites:** Graduate standing in civil engineering or consent of instructor. Basic proficiency is assumed in fluid mechanics, differential equations, and spreadsheet applications like Microsoft Excel.

**Learning Outcomes:** At the end of the semester, you should be able to:

1. Draw a figure illustrating the major reservoirs and fluxes in the hydrologic cycle.
2. Using Darcy's law, calculate groundwater flows in natural formations and approaching wells.
3. Calculate the elastic behavior of soils (swelling and compression) using effective stress.
4. Analyze transport of dissolved contaminants in saturated media and design for cleanup.
5. Derive the differential equations for water balance, groundwater head, and contaminant transport from differential control volumes, and then apply these relationships to engineering problems.

**Required Text:** Fitts, C.R. (2024), *Groundwater Science*, 3<sup>rd</sup> edition, Academic Press, ISBN 978-0-12-811455-1. A printed textbook is required for exams. Later, it will grace your library.

Week	Dates	Topic	Reading and Video Assignments*
1	8/18, 8/20	hydrologic cycle	1.1-1.7, Taylor (1966)
2	8/25, 8/27	Darcy's law ( <b>LAB #1</b> )	2.1-2.2, 2.5-2.6, 3.1-3.2, 3.4
3	9/3	potential flow	6.7, Finnemore and Franzini (2002) 14.1-14.8
4	9/8, 9/10	aquifer properties	2.4, 3.3, 3.5-3.9, 4.1-4.2, 5.1-5.6
5	9/15, 9/17	aquifer mechanics	7.1-7.8
6	9/22, 9/24	aquifer flow ( <b>EXAM #1</b> )	6.1-6.2, 6.6
7	9/29, 10/1	modeling	6.3, 9.1-9.2, 9.6
8	10/6, 10/8	MODFLOW ( <b>LAB #2</b> )	Winston (2019), Neupauer (2024)
9	10/13, 10/15	well hydraulics I	6.4-6.5
10	10/20, 10/22	well hydraulics II	8.1-8.7, Miller et al. (2007)
11	10/27, 10/29	contaminants I ( <b>EXAM #2</b> )	10.1-10.4.1, 10.5.2, 10.9.2
12	11/3, 11/5	contaminants II	11.1-11.3, 11.5-11.7
13	11/10, 11/12	groundwater remediation	11.8-11.9
14	11/17, 11/19	heterogeneity ( <b>LAB #3</b> )	Mays (2010)
15	12/1, 12/3	Colorado groundwater	Barkmann et al. (2020)

\* Please visit the course website for these supplemental reading and video assignments by Barkmann et al. (2020), Finnemore and Franzini (2002), Mays (2010), Miller et al. (2007), Neupauer (2024), Taylor (1966), and Winston (2019).

**Midterms:** Monday 9/22/2025 (weeks 1-4) and Monday 10/27/2025 (weeks 1-9).

**Final Exam:** To be scheduled during exam week (Monday 12/8/2025 through Friday 12/12/2025)

**Grades:** 10% homework, 20% 1<sup>st</sup> midterm, 30% 2<sup>nd</sup> midterm, 40% final exam.

## Homework

Homework will be assigned in class each Monday, or through Assignments and Answers on the course website, and will be due at the beginning of class on Wednesday of the following week. Engineering paper is encouraged. To clarify the presentation, accelerate the grading, and develop attention to detail, homework must comply with the following specifications:

1. Assignments must be submitted in hard copy, during class or office hours, professionally presented (no wrinkles or ragged edges), and stapled in the upper-left corner.
2. At the top of *each* page, print your name, class number, homework number, due date, and page of total (1 of 5, 2 of 5, etc.). If late, you must write the date submitted on the first page.
3. Draw a picture for *each* problem. Use a straight edge for straight lines.
4. Briefly restate *each* problem in your own words. Do not copy the problem statement verbatim.
5. State what you are going to calculate under the heading FIND.
6. State any relevant assumptions, including assumed precision of input numbers.
7. Write the units for all numbers, not just final results:
  - a. Use the same units (metric or US) as the problem.
  - b. Write 5 ft rather than 5' and 8 in rather than 8".
  - c. Units like psi are fine for results, but otherwise write lb/in<sup>2</sup> to show the units cancel.
8. Write each result, with the correct number of significant digits, on its own line.

Homework will be checked for compliance specifications 1-8. If more than one specification is overlooked, homework will be returned and considered missing until resubmitted. Homework grades are A (100), B (85), C (75), D (65), F (50), and missing (50). For example, the average of B and C is 80%, and the average of C and D is 70%. There is a five-point bonus for A homework and a five-point penalty for F or missing homework.

## Grading

- Life happens, so late homework is accepted—no questions asked—with a penalty of one letter grade per class.
- No credit for missing assignments or late assignments after solutions have been posted, which usually happens on the Wednesday evening before the midterm exam or final exam.
- No credit for missed exams, except (a) when special arrangements have been made ahead of time, or (b) with documentation of an emergency.
- Unclaimed exams, assignments, and reports will be destroyed on or after 2/1/2026.
- Final grades, rounded to two decimal places, are  $F < 60\%$ ,  $60\% \leq D < 70\%$ ,  $70\% \leq C < 80\%$ ,  $80\% \leq B < 90\%$ , and  $A \geq 90\%$ . Final grades will not include plus or minus designations.

## Communication

The business of civil engineering happens by email, so I expect you to check your CU Denver email account each and every business day. Never hesitate to email me. It's easy! See the step-by-step guide below.<sup>1</sup>

## Academic Integrity

Studying with others is useful and encouraged, but you must perform and present your own work, so copied solutions—from artificial intelligence (such as ChatGPT), from an online resource, from a tutor, from other students, or from any other source—violate the expectation for academic integrity stated in the *2025-2026 Academic Catalog*<sup>2</sup> and our Student Honor Code, attached below. To avoid plagiarism, cite your sources using American Society of Civil Engineers format.<sup>3</sup> Midterm and final exams will follow an Exam Policy to be distributed separately.

## Mental Health

Is your mental health impacted by anxiety, depression, substance use, or loneliness? If so, you are not alone, and there is help available at CU Denver Medical and Mental Health Resources.<sup>4</sup> You can visit their website below, email them at [lynxwellness@ucdenver.edu](mailto:lynxwellness@ucdenver.edu), call them at 303-315-WELL (9355), or visit them in the Lola and Rob Salazar Student Wellness Center (1355 12<sup>th</sup> Street).

## General

- We honor and acknowledge that we are in the traditional territories and ancestral homelands of the Cheyenne, Arapaho, and Ute nations.
- The University of Colorado Denver is committed to an educational environment that is inclusive and embodies the equality of opportunity. We are dedicated to the full participation of students with disabilities in the university environment. If you have a learning disability or need special accommodation, please register with Disability Resources and Services (DRS),<sup>5</sup> who will evaluate your situation on a case-by-case basis. I will provide accommodation per your letter from DRS.
- Snow Closure Hotline 877-556-3637. Campus closed? Class on Zoom with video uploaded.
- Students are responsible for all material presented in class, readings, homework, and email.
- Syllabus subject to revision.

This semester's Academic Calendar and our Student Honor Code are attached below. If you have not done so already, please detach, sign, and return it to me.

Welcome to the class!

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<sup>1</sup> <https://www.ucdenver.edu/student/stories/student-stories/how-to-write-an-email-to-a-professor>

<sup>2</sup> <http://catalog.ucdenver.edu/>

<sup>3</sup> <https://doi.org/10.1061/9780784478998.ch17>

<sup>4</sup> <https://www.ucdenver.edu/wellness/services/basic-needs/medical-and-mental-health-resources>

<sup>5</sup> <https://www.ucdenver.edu/offices/disability-resources-and-services>

[UCD Access \(Student Portal\)](#)
[Registrar Forms](#)
[Registration Information](#)
**All deadlines are 11:59 PM MT unless otherwise indicated.**

Main Session	Date	Important Notes
First day to apply for Fall Graduation via UCDAccess	April 1, 2025	
Registration begins for Fall Semester via UCDAccess	April 1-16, 2025	Check UCDAccess for your specific registration date and time assignment. For best course selection, register as soon as possible after your registration time assignment.
Open enrollment begins for Fall Semester via UCDAccess	April 17, 2025	
First day of Fall semester classes	August 18, 2025	
Last day to waitlist Fall classes using UCDAccess	August 24, 2025	
Last day to drop a Fall class without a \$100 drop charge	August 25, 2025	All waitlists will be eliminated today.
First day instructor approval may be required to add some Fall classes	August 25, 2025	If unable to enroll in UCDAccess because "Instructor Consent is Required", obtain instructor approval on a Schedule Adjustment Form.
Labor Day Holiday	September 1, 2025	No classes. Campus closed.
Census Day	September 3, 2025	Deadline time is 5:00 PM MT.
Last Day to add Fall classes in UCDAccess	September 3, 2025	Deadline time is 5:00 PM MT.
Last day to add Fall classes with instructor consent on the Schedule Adjustment form	September 3, 2025	If unable to enroll in UCDAccess because "Instructor Consent is Required", obtain instructor approval on a Schedule Adjustment Form. Deadline time is 5:00 PM MT.
Full tuition will be charged for additional Fall classes added after this date	September 3, 2025	College Opportunity Fund will not apply nor will hours be deducted from eligible lifetime hours after this date. Deadline time is 5:00 PM MT.
Last day to drop Fall classes with a financial adjustment	September 3, 2025	Deadline time is 5:00 PM MT.
Fall classes dropped after this date will appear on your transcript with a grade of 'W'	September 3, 2025	Deadline time is 5:00 PM MT.
Last day to request or cancel Grade Forgiveness for Fall Semester	September 3, 2025	Refer to the Grade Forgiveness form for restrictions. Deadline time is 5:00 PM MT.
Last day to apply for Fall graduation via UCDAccess	September 3, 2025	Deadline time is 5:00 PM MT. After this, contact your advisor.
Last day to request No Credit or Pass/Fail grade for a Fall class	October 26, 2025	Graduate degree students can exercise the P+/P/F option for undergraduate courses only. Graduate students should consult their school or college regarding the P+/P/F option. A grade of P+/P/S will not be acceptable for graduate credit to satisfy any graduate education requirement.
Last day to withdraw from a Fall class via UCDAccess	October 26, 2025	
First day to withdraw from a Fall class with a Late Withdraw Petition form	October 27, 2025	
Registration begins for Spring Semester via UCDAccess	Nov. 3, 2025 - Nov. 18, 2025	Check UCDAccess for your specific registration date and time assignment. For best course selection, register as soon as possible after your registration time assignment.
Open enrollment begins for Spring Semester via UCDAccess	November 19, 2025	
Fall Break	November 24 - 30, 2025	No classes. Campus open.
Thanksgiving Day	November 27, 2025	No classes. Campus closed.
Last day to withdraw from a Fall class with a Late Withdrawal Petition form	December 3, 2025	
Finals Week	December 8 - 13, 2025	
End of Fall semester - Commencement	December 13, 2025	
Final Fall Semester grades available on UCDAccess and transcripts (tentative)	December 18, 2025	
Winter Break	Dec. 25, 2025 - Jan. 1, 2026	No classes. Campus closed.
Fall degrees posted on UCDAccess and transcripts (tentative)	January 13, 2026	This is the date degrees will be recorded on the transcript; diplomas begin mailing approximately February 1st.



# Student Honor Code

(Revised 12/1/2022)

The Honor Code outlined below is the College of Engineering, Design and Computing statement on academic integrity. The Code articulates the College's expectations of its students and faculty in establishing and maintaining the highest standards in academic work.

## Honor Code Text

The Honor Code of the College of Engineering, Design and Computing is a statement of its students, individually and collectively:

- Students will not give or receive aid during examinations.
- Students will not use any prohibited electronic devices during examinations.
- Students will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading.
- Students will uphold the spirit and letter of the Honor Code and they will take an active role to ensure that others uphold the Honor Code and if they observe violations of the Honor Code they must report violations to their Department Chair.
- The Faculty of the College will do its part to ensure its confidence in the honor of its students. Faculty must ensure that precautions are in place to prevent the forms of dishonesty mentioned above. Faculty will also avoid, as far as practical, academic procedures that create temptations to violate the Honor Code. Faculty alone has the right and obligation to set academic requirements. However, the students and faculty will work together to establish optimal conditions for honorable academic work.

## Violations of the Honor Code

Examples of conduct that will be regarded as being in violation of the Honor Code include:

- Copying from another's examination paper or allowing another to copy from one's own paper.
- Plagiarism in any shape or form. Plagiarism is defined as the use, without giving reasonable and appropriate credit to or acknowledging the author or source, of another person's original work, whether such work is made up of code, formulas, ideas, language, research, strategies, writing or other form(s).
- Giving or receiving unpermitted aid either in person or via electronic devices.
- Engaging in unauthorized collaboration on academic assignments or examinations.
- Representing as one's own work the work of another.

## Penalties for Violating the Honor Code

Most student disciplinary cases have involved Honor Code violations. Of these, most cases arise when a student submits another's work as his or her own, gives or receives unpermitted aid, or engages in unauthorized collaboration. If a violation occurs during a quiz or on a homework assignment, the student will receive a zero for that quiz or assignment. If a violation occurs on an examination or a final project that compromises at least 15% of the final grade, the student will receive a failing grade for the course. The standard penalty for a first offense may include suspension from the College of Engineering, Design and Computing for a severe infraction of the Honor Code. The penalty for a second violation will be expulsion from the College of Engineering, Design and Computing. An instructor who notices a violation should report it to the Department Chair. The Department Chair makes a confirming determination if a violation has occurred and writes a formal letter to the student describing the penalty that will be imposed.

It is the responsibility of the student to seek clarification from the instructor when in doubt about these guidelines.

**By signing below, I affirm that I have read and understood the Student Honor code and will abide by its provisions.**

Student Name (*printed*): \_\_\_\_\_

Student ID: \_\_\_\_\_

Student Signature: \_\_\_\_\_

Date: \_\_\_\_\_