

CEE 350: Water Resources Engineering

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COURSE INFORMATION

CEE 350: Water Resources Engineering
Civil and Environmental Engineering
Spring semester 2025, 3 credits

Class meeting: Mondays, Wednesdays, Fridays; 2:00-2:50 PM; 1017 CEE Building
(All times in this syllabus are in U.S. Central time)

Textbook: Chin, David A. (2021). Water-Resources Engineering. 4th edition*. Pearson: Boston.
ISBN: 0-13-670710-6.

*3rd or 4th edition is fine

Course website: <http://canvas.illinois.edu>

Lecture recordings: <https://mediaspace.illinois.edu>

Teaching Assistant: Hassaan Khan, hak3@illinois.edu

This course will cover quantitative and qualitative aspects of water in the earth's environment and its engineering applications. Material in the course will provide a foundation and fundamental understanding for courses in Water Resources Engineering and Science (WRES). Topics include design and analysis of systems directly concerned with use and control of water, hydrology, hydraulic engineering, and water resources planning.

Course objectives. Throughout this course, students will 1) analyze fundamental principles of hydrology, 2) apply hydraulic design principles, 3) understand water resources systems, and 4) apply data and computational skills to water resources problems.

Prerequisites. CEE 202; credit or concurrent registration in CEE 201.

OFFICE HOURS

Stillwell office hours: Mondays and Thursdays 3:00-4:30 PM, 3030 CEEB

TA office hours: Wednesdays 12:00-1:30 PM, 2012 CEEB; Thursdays 12:00-1:30 PM, Smart Bridge

COURSE POLICIES

Academic integrity. Each student is expected to complete their own work. Academic dishonesty, including cheating, plagiarism, and/or copyright infringement of any kind, will not be tolerated and will be reported to the appropriate administration. Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: <https://studentcode.illinois.edu/article1/part4/1-401/>. Ignorance is not an excuse for any

academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Ask the instructor if you are in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Use of generative AI. Generative artificial intelligence (AI) tools can be useful in certain contexts. The use of generative AI tools is permitted in this course for the following activities: debugging mini-project code; checking grammar and style in mini-project written documents; and editing presentation materials. The use of generative AI **is not permitted** in this course for the following activities: completing individual or group work; writing entire sentences, paragraphs, reports, or presentations to complete class assignments; and impersonating you in classroom contexts, such as posting on the Canvas discussion board. You are responsible for the information you submit based on an AI query (e.g., that it does not violate intellectual property laws, or contain misinformation or unethical content). Your use of AI tools must be properly documented and cited to maintain academic integrity.

Illness, including COVID. Following University policy, all students are required to engage in appropriate behavior to protect the health and safety of the community. *Students who feel ill must not come to class.* In addition, students who test positive for COVID-19 must not attend class and should follow current University and CDC guidance. Students who miss class due to illness should view the recorded lecture online, contribute to the Canvas discussion board, and contact the instructor via email about options for making up missed work.

Emergency response recommendations. Emergency response recommendations can be found at the following website: <https://police.illinois.edu/em/>. Review this website and the campus building floor plans website to familiarize yourself with the building in the event of an emergency: <https://police.illinois.edu/em/building-emergency-action-plans/>.

Disability-related accommodations. To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, visit 1207 S. Oak St., Champaign, call 217-333-1970, e-mail disability@illinois.edu, or go to <https://dres.illinois.edu>. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available that can help diagnose a previously undiagnosed disability. Access these resources by visiting the DRES website and selecting "Apply for Services".

Family Educational Rights and Privacy Act (FERPA). Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See <https://registrar.illinois.edu/academic-records/ferpa/> for more information on FERPA.

Anti-racism and inclusivity. The Grainger College of Engineering is committed to the creation of an anti-racist, inclusive community that welcomes diversity along a number of dimensions, including, but not limited to, race, ethnicity and national origins, gender and gender identity, sexuality, disability status, class, age, or religious beliefs. The College recognizes that Black, Hispanic, and Indigenous voices and contributions have largely either been excluded from, or not recognized in, science and engineering, and that both overt racism and micro-aggressions threaten the well-being of our students and our university community.

The effectiveness of this course is dependent upon each of us to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable

opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students, staff, and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of the course instructor if you feel comfortable. You can also report these behaviors to the Campus Belonging Resources team at <https://diversity.illinois.edu/diversity-campus-culture/belonging-resources/>. Based on your report, Campus Belonging Resources members will follow up and reach out to students to make sure they have the support they need to be healthy and safe. If the reported behavior also violates university policy, staff in the Office for Student Conflict Resolution may respond as well and will take appropriate action.

Religious observances. Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices regarding admissions, class attendance, and the scheduling of examinations and work requirements. You should examine this syllabus at the beginning of the semester for potential conflicts between course deadlines and any of your religious observances. If a conflict exists, you should notify your instructor of the conflict and follow the procedure at <https://odos.illinois.edu/community-of-care/resources/students/religious-observances/> to request appropriate accommodations. This request should be made in the first two weeks of classes.

Sexual misconduct reporting obligation. The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential. Other information about resources and reporting is available here: wecare.illinois.edu.

LATE WORK POLICY

Late assignments. Late assignments will be accepted up to 24 hours after the due date for a 10% grading penalty. For example, if an assignment is due on April 20 at 11:59 PM and is submitted on April 21 at 5:00 PM (17 hours late), the original (hypothetical) grade of 83% will be recorded as 73%. Assignments submitted more than 24 hours late will be given a zero.

Late exams. Late or make-up exams are not allowed, except under extreme circumstances approved by the instructor in advance. Conflict exams must be taken in advance of the regularly scheduled exam, and only when approved by the instructor in advance.

IMPORTANT DATES

February 3	Add course deadline
March 7	Exam 1
March 14	Drop course deadline; credit/no-credit deadline
March 15-23	Spring break
April 25	Exam 2
May 12	Final exam, 7:00-10:00 PM; 1017 CEEB

ASSIGNMENTS

Homework. Homework assignments will take place throughout the semester, as noted in the schedule, and will reinforce the technical and mathematical concepts from class. Each student must complete and submit their own individual work.

Data-driven mini-projects. Data-driven mini-projects will be assigned throughout the semester to develop scientific computing and data handling skills in water resources engineering. These projects enable use of data to understand and design water resources systems. Students will complete these mini-projects in groups, with groups remaining together for the semester. Each group will submit a single project report. Project guidelines will be provided in class.

Scientific paper presentation. Students will work in groups to present a scientific article to the class at the end of lecture each Wednesday. The purpose of these presentations is to learn how to read and understand dense scientific material, gain experience communicating scientific findings, and to recognize that cutting edge work related to course content is ongoing. Scientific articles that relate to the topics covered in the course have been selected and are available on Canvas. The students will deliver a 12-minute presentation. All students should read the article each week. Additional guidelines on these scientific paper presentations will be provided in class.

Exams 1 and 2. Two exams will take place in class as noted in the schedule: March 7 and April 25. Topics covered by each exam will be described during the in-class review. Exams will be closed book with 1 page (front and back) of handwritten notes allowed.

Final exam. The final exam will be a cumulative, in-class exam on May 12, 7:00-10:00 PM in 1017 CEEB.

GRADING

Homework	15%
Data-driven mini-projects	20%
Scientific paper presentation	10%
Exam 1	15%
Exam 2	15%
Final exam	20%
Participation*	5%
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	100%

*Grading for participation will be assessed based on attendance in class or asynchronous Canvas discussion board posts. More than 3 absences without substantial contributions to the week's discussion board on Canvas by noon on Monday of the following week will reduce the participation grade.

Letter grades will be assigned using a plus/minus system, as below:

A	93.0-100.0%
A-	90.0-92.9%
B+	87.0-89.9%
B	83.0-86.9%
B-	80.0-82.9%
C+	77.0-79.9%
C	73.0-76.9%
C-	70.0-72.9%
D+	67.0-69.9%
D	63.0-66.9%
D-	60.0-62.9%
F	59.9% and below

SCHEDULE

Assigned reading is to be completed before the start of class.

Week	Date(s)	Topic	Textbook (Chin, 4 th edition)	Scientific Paper	Assignment Due (HW = homework; MP = mini-project)
1	Jan 22	Introduction			
	Jan 24	Water systems	1.3-1.4	Attari	
2	Jan 27	Water cycle; water balance	1.2		HW0
Hydrology					
	Jan 29	Precipitation: formation, measurement	9.2.1-9.2.2	Oki & Kanoe	
	Jan 31	Precipitation: Intensity-duration-frequency curves	9.2.3		
3	Feb 3	Precipitation: Design rainfall and extremes	9.2.5-9.2.6		
	Feb 5	Infiltration: processes	9.3.1-9.3.2	Moustakis et al.	
	Feb 7	Infiltration: models	9.3.3		HW1
4	Feb 10	Evapotranspiration: measurement	13.1-13.2		
	Feb 12	Evapotranspiration: estimation	13.3-13.5	Herrmann et al.	
	Feb 14	Groundwater: flow in porous media	14.1-14.2		
5	Feb 17	Groundwater: Darcy's Law	14.3-14.4		MP1
	Feb 19	Groundwater: flow governing equations	14.5-14.7	Yang et al.	HW2
	Feb 21	Groundwater: wells and pumping	15.2, 15.4-15.5		
6	Feb 24	Runoff and streamflow: measurement	10.1-10.3		
	Feb 26	Runoff and streamflow: models	10.4	Famiglietti et al.	
	Feb 28	Runoff and streamflow: Hydrographs	9.4, 10.5		
7	Mar 3	Flow routing	10.6		HW3
	Mar 5	Exam 1 review		Chin	
	Mar 7	Exam 1			
Hydraulics					
8	Mar 10	Flow in closed conduits	2.1-2.2		
	Mar 12	Water distribution systems: pipes, pumps, valves	2.5, 3.3	Kim et al.	
	Mar 14	Water distribution systems: design flows	3.2		
9	Mar 17-21	NO CLASS – Spring Break			
10	Mar 24	Water distribution systems: networks	2.4, 3.4		
	Mar 26	Water distribution systems: modeling	3.4	Jolly et al.	MP2
	Mar 28	Open channel flow: continuity	4.2		HW4
11	Mar 31	Open channel flow: governing equations	4.2		

Week	Date(s)	Topic	Textbook (Chin, 4 th edition)	Scientific Paper	Assignment Due (HW = homework; MP = mini-project)	
	Apr 2	Open channel flow: best hydraulic section	4.3, 5.2	Cisneros et al.		
	Apr 4	NO CLASS – Engineering Open House				
12	Apr 7	Drainage systems: principles	5.2			
	Apr 9	Drainage systems: system design	5.3-5.4	Nania et al.		
	Apr 11	Drainage systems: inlet design	11.3			
13	Apr 14	Hydraulic structures: dams, reservoirs	7.7		HW5	
	Apr 16	Hydraulic structures: hydropower	7.8	Carlino et al.		
	Apr 18	Hydraulic structures: culverts, weirs, spillways	7.2, 7.4-7.5			
14	Apr 21	Green stormwater infrastructure: low-impact development	12.2-12.3, 12.5-12.11		HW6	
	Apr 23	Exam 2 review		Bell et al.		
	Apr 25	Exam 2				
Engineering Applications						
15	Apr 28	Planning and management: economics	17.2			
	Apr 30	Lab tour				
	May 2	Water-energy-food nexus			MP3	
16	May 5	Human water systems				
	May 7	Future of water resources			MP4	
	May 12	Final exam (7:00-10:00 PM; 1017 CEEB)				