CEE 350: Water Resources Engineering

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COURSE INFORMATION

CEE 350: Water Resources Engineering
Civil and Environmental Engineering
Fall semester 2023, 3 credits

Class meeting: Mondays, Wednesdays, Fridays; 10:00-10:50 AM; 3310 Newmark
(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

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

Wednesdays and Thursdays 1:00-2:30 PM, 3030 CEEB

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.

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. The University can provide absence information to the instructor, in a manner that complies with privacy laws; consult the Office of the Dean of Students for more information. 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, you may visit 1207 S. Oak St., Champaign, call 217-333-4603, 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. You may access these resources by visiting the DRES website and selecting “Support 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 at 10:00 AM and is submitted at 5:00 PM (7 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

Sept 1	Add course deadline
Oct 6	Midterm Exam 1
Oct 13	Drop course deadline; credit/no-credit deadline
Nov 17	Midterm Exam 2
Nov 18-26	Fall break
Dec 14	Final exam, 8:00-11:00 AM; 3310 Newmark

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. Short 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.

Midterm exams. Two midterm exams will take place in class as noted in the schedule: October 6 and November 17. 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 December 14, 8:00-11:00 AM in 3310 Newmark.

GRADING

Homework	15%
Data-driven mini-projects	20%
Scientific paper presentation	10%
Midterm exam 1	15%
Midterm exam 2	15%
Final exam	20%
Participation*	5%
	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 9:00 AM 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, 4th edition)	Scientific Paper	Assignment Due (HW = homework; MP = mini-project)
1	Aug 21	Introduction			
	Aug 23	Water systems	1.3-1.4	Attari	
	Aug 25	Water cycle; water balance	1.2		HW0
Hydrology					
2	Aug 28	Precipitation: formation, measurement	9.2.1-9.2.2		
	Aug 30	Precipitation: Intensity-duration-frequency curves	9.2.3	Oki & Kanae	
	Sept 1	Precipitation: Design rainfall and extremes	9.2.5-9.2.6		
3	Sept 4	NO CLASS			
	Sept 6	Infiltration: processes	9.3.1-9.3.2	Moustakis et al.	
	Sept 8	Infiltration: models	9.3.3		HW1
4	Sept 11	Evapotranspiration: measurement	13.1-13.2		
	Sept 13	Evapotranspiration: estimation	13.3-13.5	Herrmann et al.	
	Sept 15	Groundwater: flow in porous media	14.1-14.2		
5	Sept 18	Groundwater: Darcy's Law	14.3-14.4		MP1
	Sept 20	Groundwater: flow governing equations	14.5-14.7	Kingston et al.	HW2
	Sept 22	Groundwater: wells and pumping	15.2, 15.4-15.5		
6	Sept 25	Runoff and streamflow: measurement	10.1-10.3		
	Sept 27	Runoff and streamflow: models	10.4	Famiglietti et al.	
	Sept 29	Runoff and streamflow: Hydrographs	9.4, 10.5		
7	Oct 2	Flow routing	10.6		HW3
	Oct 4	Midterm exam 1 review			
	Oct 6	**Midterm Exam 1**			
Hydraulics					
8	Oct 9	Flow in closed conduits	2.1-2.2		
	Oct 11	Water distribution systems: pipes, pumps, valves	2.5, 3.3	Slater et al.	
	Oct 13	Water distribution systems: design flows	3.2		
9	Oct 16	Water distribution systems: networks	2.4, 3.4		
	Oct 18	Water distribution systems: modeling	3.4		MP2
	Oct 20	Open channel flow: continuity	4.2		HW4
10	Oct 23	Open channel flow: governing equations	4.2		

Week	Date(s)	Topic	Textbook (Chin, 4th edition)	Scientific Paper	Assignment Due (HW = homework; MP = mini-project)
	Oct 25	Open channel flow: best hydraulic section	4.3, 5.2	López & Alfonso	
	Oct 27	Drainage systems: principles	5.2		
11	Oct 30	Drainage systems: system design	5.3-5.4		
	Nov 1	Drainage systems: inlet design	11.3	Nania et al.	
	Nov 3	Hydraulic structures: dams, reservoirs	7.7		HW5
12	Nov 6	Hydraulic structures: hydropower	7.8		
	Nov 8	Hydraulic structures: culverts, weirs, spillways	7.2, 7.4-7.5	Turner et al.	
	Nov 10	Green stormwater infrastructure: performance	12.2-12.3		
13	Nov 13	Green stormwater infrastructure: low-impact development	12.5-12.11		HW6
	Nov 15	Midterm exam 2 review			
	Nov 17	**Midterm Exam 2**			
14	Nov 20-24	NO CLASS			
Engineering Applications					
15	Nov 27	Planning and management: economics	17.2		
	Nov 29	Lab tour			
	Dec 1	Water-energy-food nexus			MP3
16	Dec 4	Human water systems			
	Dec 6	Future of water resources			MP4
	Dec 14	**Final exam (8:00-11:00 AM; 3310 Newmark)**			