

Irrigation and Drainage Systems Engineering
Mondays & Wednesdays 03:00 PM to 04:15 PM; CHA-149 EAST

Instructor Name: Saleh Taghvaeian

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Office: 231 Chase Hall; **Hours of Availability:** by appointment

Course Prerequisites: CIVE 310 or MECH 310; AGEN 344 or BSEN 344

Course Description

Analytical and design consideration of evapotranspiration, soil moisture, and water movement as related to irrigation and drainage systems; analysis and design of components of irrigation and drainage systems including water supplies, pumping plants, sprinkler systems, and center pivots.

Learning Outcomes

After taking this course, students should be able to:

- Measure water flow rate in open channels and pipes.
- Estimate reference and crop evapotranspiration for different crops and periods of growth.
- Describe different types of pumps and their selection criteria.
- Design the main pipe (material and size).
- Describe the design criteria and procedure for different irrigation systems.
- Explain environmental aspects of agricultural irrigation with a specific focus on salinity.
- Explain drainage basics and the equations used for designing drainage systems.

The expected learning outcomes correspond to the following ABET student outcomes:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.



Course Materials

- Eisenhauer, D. E., D. L. Martin, D. M. Heeren, and G. J. Hoffman. 2021. Irrigation Systems Management. ASABE: St. Joseph, Mich. Open access, available at: <https://asabe.org/ism>
- Class notes and power-point slides

Course Grading Policy

Percent of final grade

Assignments/Reports/Activities: 70%

Mid-term Exam (take-home): 15%

Final Exam or Project (take-home): 15%

Letter grade

96-100% = A+	93-95.99% = A	90-92.99% = A-	86-89.99% = B+	83-85.99% = B
80-82.99% = B-	76-79.99% = C+	73-75.99% = C	70-72.99% = C-	66-69.99% = D+
63-65.99% = D	60-62.99% = D-	<60 = F		

Late submissions

Canvas estimates and reports delayed submissions in days (d). For example, 12 hours of delay is $d=0.5$. For late submissions, the grade will be multiplied by $[1-(0.25 \times d)]$. So, a 4-day delay results in a zero grade.

Submission format

All homework assignments and lab reports must be typed in word processing programs like MS Word following a format like the one in the assignments. Equations must be entered using the "Insert Equation" option (no scanned image). Before submitting, always ask yourself: Does This Make Sense?

Course Schedule (cells in red shading indicate lab sessions held at the Hydraulics lab)

Week	Monday		Wednesday	
	Date	Topic	Date	Topic
1	08/21	Introduction	08/23	Soil water storage
2	08/28	Soil water lab	08/30	Soil infiltration/water measurement
3	09/04	Labor Day	09/06	Water measurement
4	09/11	Water measurement lab	09/13	Evapotranspiration
5	09/18	Evapotranspiration	09/20	Pipeline hydraulics
6	09/25	Pipeline hydraulics	09/27	Groundwater, wells, and pumps
7	10/02	Groundwater, wells, and pumps	10/04	Groundwater, wells, and pumps
8	10/09	Pipeline hydraulics lab	10/11	Irrigation system design (sprinkler)
9	10/16	Fall Break	10/18	Irrigation system design (sprinkler)
10	10/23	Pumps lab	10/25	Irrigation system design (sprinkler)
11	10/30	Irrigation system design (micro)	11/01	Irrigation system design (surface)
12	11/06	Irrigation system lab	11/08	Irrigation system performance
13	11/13	Irrigation system performance	11/15	Environmental considerations
14	11/20	Soil and water salinity	11/22	Thanksgiving
15	11/27	Soil and water salinity	11/29	Drainage
16	12/04	Chemigation lab	12/06	Drainage
17	12/11	Finals		

Instructional Continuity Plan

If in-person classes are cancelled, students will be notified of the instructional continuity plan for this class by Canvas.

UNL Course Policies and Resources

Students are responsible for knowing the university policies and resources found on this page

(<https://go.unl.edu/coursepolicies>):

- University-wide Attendance Policy
- Academic Honesty Policy
- Services for Students with Disabilities
- Mental Health and Well-Being Resources
- Final Exam Schedule
- Fifteenth Week Policy
- Emergency Procedures
- Diversity & Inclusiveness
- Title IX Policy
- Other Relevant University-Wide Policies