

ESCI 3306/3106 - Principles of Hydrology and Lab

Fall 2023, CRN 16640 and 16639

Lecture Date/Time: MW, 1:30-3:20 PM

Lecture Location: Geology Building, Room 302

Lab Date/Time: R, 1:30-4:20 PM

Lab Location: Geology Building, Room 404



Instructor: Dr. Mark Engle (maengle@utep.edu)

Office: Geology Building 302A

Office hours: Monday, 9:30-10:30AM. Otherwise, send me an e-mail and I'll respond, or we can set up a meeting through Zoom.

Prerequisite Courses: ESCI 1301 or GEOL 1313 or GEOL 1211

Course Description: Fundamental principles of hydrologic sciences and water as a natural resource. Topics covered include aspects of the hydrologic cycle, streams and flooding, groundwater and aquifers, water quality, and water distribution and use. Materials from local and current interests are incorporated.

Learning Outcomes: (Describe the measurable learning outcomes for the course.)

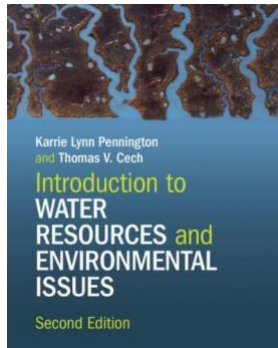
Students who have successfully completed this course will be able to:

- 1) Define and describe key hydrologic processes operating in arid vs. humid and coastal vs. inland environments.
- 2) Identify natural controls on stream flow
- 3) Describe how human activities affect flooding and runoff
- 4) Define water table, saturated zone, and unsaturated zone
- 5) Identify major water quality issues
- 6) Provide an account of water resources, withdrawals, consumption, and uses locally and nationally
- 7) Describe major U.S. legal and regulatory statutes affecting water

- 8) Be able to work with and analyze hydrologic data using spreadsheets and data analysis programs (such as R).

Required Materials:

- 1) Introduction to Water Resources and Environmental Issues, 2nd edition by Karrie Lynn Pennington and Thomas V. Cech



You will be expected to have read to required reading prior to attending class, as the lectures are primarily meant to quickly summarize key points and cover other material in detail.

- 2) Access to a laptop computer with a spreadsheet program (e.g., Excel, Numbers, or Libre Office Spreadsheet) and R (www.r-project.org) with the R Studio front-end (www.rstudio.com).

Course Policies: (Grading, attendance, academic integrity, etc.)

Course Grading:

Lecture Portion:

Exams	40%	(Average of 4 Exams)
Homework Assignments	40%	(Class Assignment)
In-Class Participation	20%	(Must attend class)

Lab Portion:

Laboratory Assignments	60%	(Lab Reports)
In-Class Participation	40%	(Must attend class)

There will be no make-up exams, unless you have a documented health issue. Assignments will be docked by 20% of their score for each 24 hours they are late.

Grading scale: A-100-85%; B- 84-75%; C-74-65%, D- 64-55%; F-below 55%.

Attendance: Attendance, which is key to success in this class, is mandatory and reflected in the course grading. If you have a legitimate reason for missing class (e.g., medical

appointment or illness, military service, or official University activities), please notify the instructor prior to the absence (as possible) and provide documentation. In the case of poor class attendance, students may be dropped from the class.

Exams: There will be 4 exams. They are take home-style that are open-note and open-book. You will have 1 week after I assign the exam to upload it to BlackBoard. Feel free to work together, if you wish, but you must turn in your own work.

Concept sketches: Most weeks, I will ask you to draw a sketch (that is, don't copy and paste the digital image – I literally want you to draw it), label the relevant features, and describe in complete sentences you're the important processes and events occurring. You will need to upload these to BlackBoard by 5PM on the Friday of the week assigned.

In-class exercises and laboratory assignments: In lieu of concept sketches, I may assign an in-class exercise or an assignments from your textbook. Similarly, laboratory assignments will be given out on Thursdays, during lab. Both types of assignments are due Wednesday of the following week by 5PM (upload to BlackBoard).

Getting dropped from class: If you are severely failing the class (grade <40%) at the Drop Date or miss 3 or more assignments/lectures in a row, I may drop you course. If you would like to remain in the class and are under one or more of those conditions, please contact me prior to the drop date.

Academic Integrity: Academic dishonesty will be not tolerated in this class (please refer to the student conduct code handbook for details regarding university policy and definitions). Dishonesty includes, but is not limited to, plagiarism on term papers, unauthorized notes brought into an exam; copying answers from another student or letting another student copy your answers. The penalty for the first offense will be a grade of zero points on the exam or assignment. Penalty for the second offense will be an F for the course.

Course Statements: (Civility, disability, military, etc.)

Students with Disabilities: If you have a disability or if you are experiencing learning difficulties, please contact the Center for Accommodations and Support Services (CASS). You may contact them Monday through Friday 8:00a.m.-5:00p.m. Phone:(915) 747-5148. Union Building East Room 106 cass@utep.edu. They provide any necessary accommodations. You should also meet with me in order to facilitate your needs. You are expected to provide documentation of your disability in order to make special arrangements in this class.

Helpful Hints:

- Attend the lectures!
- Review material regularly - multiple short study sessions over a period of weeks are more effective than a single "cram" the night before an exam.
- Form a study group. Each member should study material on their own before meeting with the group for discussion and comparison.

- Ask questions if you don't know or are confused.
- Combine class notes, textbook, and web materials when studying. Each provides a different perspective.

Tentative Schedule: (List of topics to be covered by specified timeline. Special target deadlines, such as examination days, last day to withdraw without penalty, and date and time of final exams also shown.)

Week	Topic Covered	Required Reading	Lab Module
1 (Aug. 28)	Introduction/Syllabus	Syllabus	Spreadsheet Basics
2 (Sept. 4)	Quantities, Units, Scales, and Conversions – Monday Labor Day (no class)	Chapter 1	Volumes, velocities, and values
3 (Sept. 11)	Distribution of the Earth's Water; Watersheds and Water Use	Chapter 3	Introduction to R and R-Studio
4 (Sept. 18)	Properties of Water; Hydrologic Cycle; Climate and Weather	Chapter 3	Water use volumes and categories
5 (Sept. 25)	Water Fluxes, Storage, and Balances - Exam 1	Chapter 3	Hydrologic Box Modeling in R
6 (Oct. 2)	Water Quality, Regulations, and Pollution	Chapter 4	Water Quality Data Retrieval in R
7 (Oct. 9)	Watershed Structure and Function; Storm hydrographs	Chapter 5	Excess Rainfall Hyetographs
8 (Oct. 16)	Aquifer properties and Bernoulli's equation	Chapter 6	Kriging potentiometric surface
9 (Oct. 23)	Groundwater occurrence and behavior; Hueco Bolson Exam 2	Chapter 6	Catch-up and review
10 (Oct. 30)	Open channel flow and discharge; stream morphology 11/13 is Fall Drop Deadline	Chapter 8	Stream Morphology using the EM Stream Table
11 (Nov. 6)	Floods and Flooding (Guest lecture from Delbert Humbertson at IBWC)	Chapter 8	Flood probability and discharge for the Rio Grande at El Paso
12 (Nov. 13)	Lakes, ponds, reservoirs, and evaporation	Chapters 7, 10	Class A pan evaporation data

13 (Nov. 20)	Wetlands, bogs, etc.; Water energy balances and ET	Chapters 9	None – Thanksgiving
14 (Nov. 27)	Drinking Water, Water Treatment, Waste Water	Chapter 11, 14	Ensemble Evapotranspiration Modeling in R
15 (Dec. 4)	Water Allocation and Water Use in Energy Final Exam	Chapter 12	None – Work on your exam!
	Comprehensive Final Exam Due, December 13th		

UPDATED 8/22/23