

# ESCI 3306/3106 - Principles of Hydrology and Lab

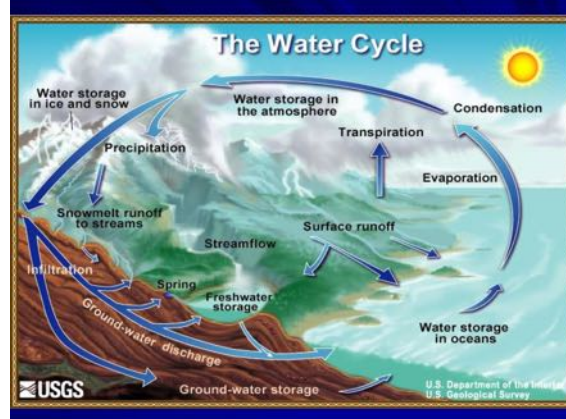
Spring 2022, CRN 28267 and 28266

Lecture Date/Time: MW, 10:30-11:50AM

Lecture Location: Geology Building, Room 302

Lab Date/Time: R, 9:00-11:50 AM

Lab Location: Geology Building, Room 404



**Instructor:** Dr. Mark Engle ([maengle@utep.edu](mailto: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.

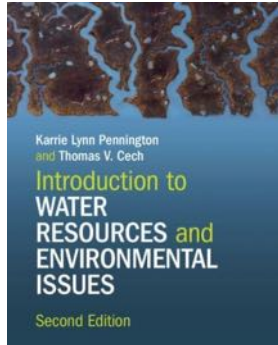
**Learning Outcomes:** (Describe the measurable learning outcomes for the course.)

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, 2<sup>nd</sup> 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 portable computer with a spreadsheet program (e.g., Excel, Numbers, or Libre Office Spreadsheet) and R ([www.r-project.org](http://www.r-project.org)) with the R Studio front-end ([www.rstudio.com](http://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 will be 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.

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 (April 1<sup>st</sup>).

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](mailto: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 1	Topic Covered	Required Reading	Lab Module
1 (1/17)	Introduction/Syllabus	Syllabus	Syllabus
2 (1/24)	Scientific Units and Unit Conversions in Hydrology	TBA	Volumes, velocities, and values
3 (1/31)	Distribution of the Earth's Water	Chapter 1	<a href="#">Where's the World's Water?</a>
4 (2/7)	Introduction to the Hydrologic Cycle	Chapter 3	None
5 (2/14)	Water Fluxes, Storage, and Balances - <b>Exam 1</b>	Chapter 3	<a href="#">Spreadsheet Modeling of the Hydrologic Cycle</a>
6 (2/21)	Water Quality	Chapter 4	<a href="#">EPA's Water Quality Impairments in the Rio Grande</a>
7 (2/28)	Watershed Structure and Function	Chapter 5	<a href="#">Excess Rainfall</a>
8 (3/7)	Groundwater and soil water, Week 1	Chapter 6	<a href="#">Ant Farm and Water Table Groundwater Models</a>
9 (3/14)	Spring Break – No Class		
10 (3/21)	Groundwater and soil water, Week 2 - <b>Exam 2</b>	Chapter 6	<a href="#">Potentiometric surface models</a>
11 (3/28)	River Systems and watershed management, Week 1 <b>4/1 is Spring Drop Deadline</b>	Chapter 8, 10	<a href="#">Flood Frequency and Risk Analysis</a>
12 (4/4)	River Systems and watershed management, Week 1	Chapters 8, 10	<a href="#">Watershed Analysis</a>
13 (4/11)	Wetlands, Ponds, and Lakes	Chapters 7,9	<a href="#">Estimating ET from a Water Balance</a>
14 (4/18)	Drinking Water and Water Treatment - <b>Exam 3</b>	Chapter 11	Water quality data in R
15 (4/25)	Water Allocation and Water Laws	Chapter 12	<a href="#">Western Water Law</a>
16 (5/2)	Politics and Conflict over Water	Chapters 13,14	None
	<b>Comprehensive Final Exam, May 13th</b>		

UPDATED 12/7/21