CE 5364
Groundwater Transport Phenomena
Summer 2020

Class Meetings: Three 90-minute lectures per week, recorded TWTh, 10-11:30 a.m.
Instructor: Dr. Ken Rainwater, CE 117, CE 117, 834-7775.
Office Hours: MTWTh (2:00-4:30), or by appointment.
Text: *Ground Water Contamination*, 2nd ed., Bedient, Rifai, and Newell and other readings as pdfs.

Course Schedule

Week	T	W	Th	Topics and **Events**
1	6/2	6/3	6/4	Introduction (Ch 1), Sources (Ch 4), Anisotropy, Transport Mechanisms (Ch 6)
2	6/9	6/10	6/11	Fate Processes (Ch 7), Modeling Attenuation (Ch 8), Risk Assessment
3	6/16	6/17	6/18	Risk Assessment, Numerical Models (Ch 10), MODFLOW/MODPATH/MT3D Models
4	6/23	6/24	6/25	MODFLOW/MODPATH/MT3D Models, Attenuation/RBCA (Ch 12)
5	6/30	7/1	7/2	**Exam 1,** Site Investigations (Ch 5)
6	7/7	7/8	7/9	Flow and Transport in Unsaturated Zone (Ch 9), CHEMFLO Model
7	7/14	7/15	7/16	CHEMFLO Model, NAPLs (Ch 11)
8	7/21	7/22	7/23	Remediation Alternatives (Ch 13)
9	7/28	7/29	7/30	Legal Protection (Ch 14)
10	8/4	8/5		Other topics, Review

Final Exam: Friday, August 7, 11:00 a.m. -1:30 p.m.

Course Objectives

The student will be trained in the fundamental descriptions of the physical and chemical processes that control the movement of contaminants in the subsurface. Analytical solutions and existing computer models will be presented to typify the available tools with corresponding limitations.

Course Policy

1. Homework and projects – Several homework and project assignments will be distributed through the semester, weighted according to their relative scopes. After the graded homeworks are returned, the solutions will be posted. Use of spreadsheets is encouraged for repetitive tabular calculations and graphs, but sample calculations are required for full credit. Each student must submit his/her own spreadsheet. Put your name on each page.
2. Exams – Two exams will be given. The final exam will only cover the material after Exam 1. No make-up exams will be given for simple absence.
3. Class conduct – Students are expected to treat each other and the instructor respectfully. All students are expected to observe appropriate personal hygiene practices.

Grading Policy

Homework and projects	60%
Exams	40%
Total	100%

Religious Holidays

"Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the

absence. A student who is excused under section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

Academic Dishonesty
Academic integrity is taking responsibility for one's own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. If you don't cheat, we'll be fine.

Disability Policy
Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in West Hall or call 806-742-2405.

CECE Departmental Calculator Policy for Exams
Only NCEES approved calculators will be permitted during tests, and your test will be collected and your grade will be a zero if you are caught using a non-approved calculator. The approved calculators include the following:

- Casio: All fx-115 and fx-991 models (Any Casio calculator must have "fx-115" or "fx-991" in its model name.)
- Hewlett Packard: The HP 33s and HP 35s models, but no others
- Texas Instruments: All TI-30X and TI-36X models (Any TI calculator must have "TI-30X" or "TI-36X" in its model name.)

Laptops/PDAs/MP3 Players/Cell Phones/etc.
The use of laptops, phones, and MP3 players is not permitted during lectures or exams without consent of the instructor. While discussions of software applications are presented in class, you are normally expected to do your own applications with your own computer outside of class. This approach will be apparent as the course progresses. The instructor will be available in office hours and beyond for your questions.