

CEE 564 Contaminant Fate and Transport

Fall 2017 Class Syllabus

Credits:	3
Class time:	Tuesday & Thursday, 1:30 - 2:45 PM
Class location:	USE 103
Instructor:	Anca G. Delgado
Instructor email:	anca.delgado@asu.edu
Office hrs:	Wednesday: 3:00 PM - 4:00 PM, Biodesign Institute, room A214B. Additional office hours by appointment.
Required text:	Harold F. Hemond and Elizabeth J. Fechner, <i>Chemical Fate and Transport in the Environment</i> (3 rd . Edition), Elsevier, Waltham, MA, 2015
Course web page:	Blackboard at MyASU

Course objectives:

Contaminant Fate and Transport is an environmental engineering graduate core course. The course introduces students to the fundamental processes controlling the fate and transport of chemicals in natural and engineered settings, and how these processes are described, modeled, monitored, and quantified. Students will be able to (a) mathematically describe these phenomena, (b) assess the significance of individual processes, (c) assess uncertainty, (d) anticipate solutions, and (e) monitor chemical fate and transport. Problems will illustrate application to surface waters (streams, rivers, lakes, estuaries, wetlands), the subsurface environment (groundwater), and the atmosphere. The course will begin with a review of chemical concentration, conversions, mass balances, and environmental chemistry. Then we will proceed to describe chemical fate (biotic and abiotic) and transport phenomena in the surface, subsurface, and the atmosphere.

Grading:

- **60% Assignments**
 - Assignments will consist of problems, theoretical concept elaborations, and critical reviews of journal articles and current events articles concerning fate and transport of chemicals in environmental engineering applications.
 - Assignments are due in class on their due date or electronically (by email) before class. I will post the assignment solutions shortly after class so I cannot accept late submissions.
 - It is absolutely essential that you are able to communicate clearly and write neatly. Any diagrams, graphs or pictures should be neatly drawn and clearly labeled. Box your answers.
- **20% Exam 1**
 - Tentatively on October 12th covering material up to that point.
- **20% Exam 2**
 - On November 30th during normal class time covering material since Exam 1

Academic integrity:

Academic dishonesty will not be tolerated. Please see the Student Code of Conduct set forth by the Arizona Board of Regents. This includes copying of homework. You are encouraged to discuss the homework problems with your classmates, but the final work that is turned in must be your own. Exams will solely be individual efforts. Students are expected to abide by the ASU Student Code of Conduct and Academic Integrity Policy (<https://eoss.asu.edu/dos/srr/codeofconduct>).

Additional information:

1. Collaboration is acceptable and encouraged for completing the assignments. However, it is expected that you will do your own work on each problem. Each student must complete all parts of the problem on their own.
2. Students are required to be on time for class and not distract the fellow classmates or the instructor. The use of cell phones is prohibited. If you need to make or take a call, you can leave the classroom, making sure you do not disturb the class.
3. Make sure to take advantage of office hours. I cannot make sure that every student understands the material given in every class. If you did not understand the material, come talk to me and I will do my best to explain.
4. I will use a standard grading curve with a +/- system as follows:
 - A+: > 96.5%
 - A: > 90 – 96.5%
 - A-: 89 – 90%
 - B+: 87 – 88.9%
 - B: 80 – 86.9%
 - B-: 78 – 79.9%
 - C+: 76 – 77.9%
 - C: 68 – 75.9%

Family Education Rights and Privacy Act (FERPA):

The instructor is not allowed to discuss student's academic status over the phone, or with anyone other than the student. A FERPA release will exempt you from these regulations.

Additional policies can be found at:

ACD 304–02, “Missed Classes Due to University-Sanctioned Activities”

ACD 304–04, “Accommodation for Religious Practices”

ACD 304–06, “Commercial Note Taking Services”

SSM 700, “Disability Resources.”

Course outline and schedule

Week	Date	Topic/Activity	Due
1	Th 17-Aug	Introduction, Chemical concentration	
2	T 22-Aug	Mass balances, Advective/dispersive transport	
	Th 24-Aug	Chemical equilibria, Electroneutrality, Mass conservation	
3	T 29-Aug	Chemical kinetics, Partitioning	
	Th 31-Aug	Module 1: Fate and transport in surface waters Rivers	Assignment 1
4	T 5-Sep	Lakes and wetlands, Estuaries	
	Th 7-Sep	Sediment transport, Bottom sediments	
5	T 12-Sep	Air-water exchange	
	Th 14-Sep	Major ion chemistry of natural waters	
6	T 19-Sep	Ecosystem characteristics, Redox chemistry	
	Th 21-Sep	Redox chemistry in ecosystems	
7	T 26-Sep	BOD/DO modeling	
	Th 28-Sep	Microbial kinetics	
8	T 3-Oct	Module 2: Fate and transport in the subsurface Groundwater and aquifers	
	Th 5-Oct	Groundwater remediation seminar	Assignment 2
9	T 10-Oct	Fall break – no class	
	Th 12-Oct	Darcy's law	
10	T 17-Oct	Exam 1	
	Th 19-Oct	Flow nets, Wells, Superposition, Capture curves	
11	T 24-Oct	Critical review prep	
	Th 26-Oct	Dispersion	
12	T 31-Oct	Retardation, Biodegradation, Subsurface remediation	
	Th 2-Nov	Module 3: Fate and transport in the atmosphere Atmospheric structure, Adiabatic lapse rates	
13	T 7-Nov	Global, Synoptic, Local scale circulation	Assignment 3
	Th 9-Nov	Indoor air pollution	
14	T 14-Nov	Gaussian plume modeling, Deposition processes	
	Th 16-Nov	Tropospheric chemistry, Acid deposition Stratospheric chemistry	
15	T 21-Nov	Review for exam	Assignment 4
	Th 23-Nov	Thanksgiving – no class	
15	T 28-Nov	Exam 2	