ENV 4053/5055: Chemical Fate and Transport

Fall 2000 – MW 4:45 pm - 6:00 pm EST, CEB Room 313
Department of Civil and Environmental Engineering
FAMU-FSU College of Engineering
3 Credit Hours
Prerequisites: CWR 3201; EES 3040; or equivalents

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Office Hours:	Monday/Wednesday 11am-12:30pm;
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Required Textbook:

Hemond, H. and E. J. Fechner-Levy. *Chemical Fate and Transport in the Environment*, 2nd edition. Academic Press, 1999. ISBN: 0123402751

Course Web page:

`http://campus.fsu.edu/courses/ENV4053-C1.fa00/`
All students should use this CourseInfo Web page, which merges ENV4053 and ENV5055. FSU students should use their ACNS garnet/mailer username and password to login. FAMU students should use their Engineering account, with the "_eng" appended to their username. Example: if eng.fsu.edu username is jsmith, then CourseInfo username = jsmith_eng; password is the same).

Possible alternative Web page:
`http://www.eng.fsu.edu/~abchan/envfate/envfate.html`

Course Description

Study of the processes of pollutant chemicals transformation in and transport between air, water and subsurface. Use and development of predictive mathematical models for remediation of existing contaminated sites or prevention of future contamination from new sources.

Course Objectives

1. Analyze environmental engineering problems related to the fate of transport of chemicals in surface waters, the subsurface, and atmosphere, by applying knowledge of mathematics, physics, chemistry, and engineering principles.
2. Describe numerical, field, and laboratory procedures to analyze environmental chemical fate and transport.

3. Differentiate between chemical fate and transport processes in surface water, subsurface and atmospheric environments.
4. Describe the interdisciplinary and multidisciplinary nature of environmental engineering problems.
5. Analyze practical chemical fate and transport problems through identification, formulation and solving.
6. Recognize ethical and professional practice issues related to environmental engineering.
7. Practice effective technical communication.
8. Apply broad skills necessary to understand the impact of engineering solutions in a global and societal context, as related to environmental issues.
9. Use resources which engage the student in lifelong learning of environmental engineering issues.
10. Describe contemporary environmental engineering issues.
11. Apply mathematical models and engineering tools to describe and analyze environmental chemical fate and transport processes.

Proposed Course Outline

- **Basic Concepts** (Chapter 1): mass balance, physical transport, environmental chemistry, phase distribution.
- **Surface Waters** (Chapter 2): transport, air-water exchange, chemical and biological characteristics, dissolved oxygen modeling, biodegradation, chemical transformations.
- **Subsurface Environment** (Chapter 3): groundwater movement, well hydraulics, retardation/sorption, biodegradation.
- **Atmosphere** (Chapter 4): atmospheric stability, chemical transport, chemical reactions.

Honor Code

The honor codes of both Florida A & M University and Florida State University is taken seriously. This course will be conducted in compliance with these honor codes. Cheating, dishonesty, and/or unethical behavior *will not* be tolerated in any component of this course. You, as a student and a person, will gain the most by adhering to the honor code.

Unless stated otherwise, you may discuss homework problems with other class members. Nevertheless, you are expected to completely understand and have actively participated in the preparation of all assignments that you turn in for this course. Clearly, teaching a

concept to another class member is different from allowing him/her to copy your homework. If computer programs, such as spreadsheets and plotting programs, are used as tools to complete assignments, each student must prepare his/her own computer files and output (spreadsheets, graphs, etc.). Turning in duplicates of a single output *is not acceptable.* When completing assignments, you *may not* refer to assignments, solutions or exams from previous years. However, such material may be used when studying for exams.

Assignments must be pledged; write "I have abided by the honor code of [FAMU/FSU]" and sign. With your pledge, you should list the names of anyone with whom you worked.

Course Grading

Homework	30%
Term Project	20%
Exams (3)	33%
Final Exam	17%

This course is not graded on a curve. Each student is compared to a standard that I set for achievement. In general, semester grades of 90-100% will receive a final grade of A, 80-89.9% B, 70-79.9% C, 60-69.9% D, and 59.9% or lower F.

Homework

Homework assignments will be posted on the course Web page. Homework assignments will consist predominantly of problem sets. There will be approximately 8 homework assignments during the semester. All homeworks will be weighted equally, unless stated otherwise.

All assignments should be prepared in a professional manner; they should be neat and legible. Show all your work and include the given information, assumptions, and equations used. When using computer tools (spreadsheets, etc.), be sure to state the equations used for the calculations. Box or circle your final answers, when appropriate. If your method is unclear, partial credit cannot be given.

All homework assignments must be submitted on the given due date. Each student is permitted one homework extension during the semester. A *late* homework is due at the next class meeting. If an assignment is due shortly before an exam and the solutions are discussed in class on the assignment due date, then this homework may not be turned in late. You will be forewarned is this occurs.

Exams

There will be 3 in-class exams and one comprehensive final exam. All exams will be closed book and closed notes; however, one 8.5" x 11" two-sided sheet of notes is permitted.

Term Project

This project will consist of an in-depth evaluation of a chemical fate and transport process/mechanism in the context of a current environmental engineering problem or a case study. It is comprised of three parts: 1) preliminary research, 2) detailed outlines, and 3) final report.

This project serve several purposes. First, the term project is meant to put material from class and the text in context. Second, through the executive summaries, you will become familiar with environmental engineering problems different from the one you are researching. Third, completing the project will promote your technical writing and communication skills.

Tentative Schedule

Topic proposal	September 20
Preliminary research (25% of project grade)	October 18
Detailed outline (10% of project grade)	November 8
Final report (65% of project grade)	December 4

Preliminary Research

The preliminary research has two parts:

1. In Part 1, prepare an annotated bibliography for your topic. The annotated bibliography must include at least 5 relevant references, listed in alphabetical order and fully cited so that someone else can find the references. Include a concise description (one paragraph) of the relevant information found in each reference.

2. In Part 2, the following questions should be answered:

   (a) What is the most important issue/concept that the class should learn from my research?

   (b) How can I relate the topic to class material? What class concepts can be emphasized?

   (c) What completely new concepts must be explained with the context of my executive summary and report?

Final Report

The final report should be 10 pages in length. In addition, an 1-page executive summary should be included.