

Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 4990 Chemical Fate and Transport in the Environment
Elective
Fall Semester 2007

2007 Catalog Data:	CEE 4990 (5990). Special Problems. Lecture 3. Credit 3. Prerequisite: Approval of Department Chairperson
Textbook:	Hemond and Fechner-Levy, <u>Chemical Fate and Transport in the Environment</u> , Academic
Reference:	Chapra, <u>Surface Water Quality Modeling</u> , McGraw-Hill. Schnoor, <u>Environmental Modeling</u> , Wiley.
Coordinator:	L. Weathers, Associate Professor of Civil and Environmental Engineering
Goal:	The goal of CEE 4990 is to build upon basic environmental engineering skills as produced in CEE 3410 in order to learn the basic principles of fate and transport of pollutants in the environment, with special emphasis on surface water.

Course learning objectives:

1. The student is to become knowledgeable of reaction kinetics and reactor mass balances.
2. The student is to become knowledgeable of systems of reactors.
3. The student is to become knowledgeable of computer methods to solve differential equations.
4. The student is to become knowledgeable of quantitative descriptions of mass transport in various water quality environments (e.g., rivers and streams, lakes, sediments).
5. The student is to become knowledgeable of processes impacting dissolved oxygen in environmental systems.

Course measurable outcomes:

Students will be expected to:

1. understand the basic principles of reaction kinetics and reactor mass balances;
2. understand the basic principles of systems of reactors;
3. understand the basic principles of computer methods to solve differential equations;
4. understand the basic principles of quantitative descriptions of mass transport in various water quality environments (e.g., rivers and streams, lakes, sediments); and
5. understand the basic principles of processes impacting dissolved oxygen in environmental systems.

Topics covered: (Three lectures per week, 55 minutes each)

1. Completely mixed systems (13 classes)
2. Incompletely mixed systems (9 classes)
3. Water quality environments (6 classes)
4. Dissolved oxygen and pathogens (11 classes)
5. Tests (3 classes)

Contribution of the course to meeting professional component:

Meets requirement of one and one-half years of engineering topics to include engineering sciences and engineering design appropriate to the students field of study.

ABET category content as estimated by faculty member who prepared this course description:

Engineering Science: 3 credits or 100%

Relation of course to program outcomes:

- Outcome 1: The graduates will have a broad understanding of the relevant principles of mathematics, science, and engineering.
- Outcome 2: The graduates will have a general comprehension of four technical areas appropriate to civil engineering.
- Outcome 5: The graduates will have effective communication skills.
- Outcome 11: The graduates will have an understanding of the importance of fundamental and applied research in the advancement of engineering knowledge.

Relation of course to ABET Criteria:

<u>General Criteria</u>	Bloom's Level of Achievement
(3a) Knowledge of math, science, engineering	3
(3e) Identify, formulate, and solve engineering problems	3
(3k) Techniques, skills, modern tools necessary for engineering practice	3

<u>Program Criteria</u>	Bloom's Level of Achievement
1. Apply knowledge of math and sciences	3
2. Apply knowledge of four technical areas appropriate to civil engineering	3

Computer usage:

1. Spreadsheet analysis

Laboratory projects: None

Prepared by: L. Weathers

Date: September 2007