

Syllabus - spring 2009
CE 559: Water Quality Modeling

Instructor: Chad Jafvert 3145D Civil
 Office hrs: when you can catch me.

Schedule: MWF 9:30 – 10:20 a.m., CIVL 2123

References: Schnoor, J. L. *Environmental Modeling*, 1996
 Thomann, R.V. *Prin. Surf. Wat. Qual. Modeling*, 1987.

Description: Mathematical modeling of chemical and biological processes occurring in natural aquatic systems. Classical oxygen demand and nutrient processes are modeled, as well as chemical specific transport and fate processes. Emphasis is placed on deterministic models, mass balance approaches and chemical specific coefficients or parameters.

Evaluations: Students will be evaluated by their performance on the following tasks, with the associated weighted percentage. Homework will not be accepted past the due hour. Homework will be due at the beginning of designated class periods.

Problem Assignments	25%
Exam 1	20%
Exam 2	25%
Exam 3	30%

- Course Objectives:** After this course, the student will be able to:
1. Apply water quality models to natural and engineered systems,
 2. Identify processes critical in the proper formulation of water quality models,
 3. Formulate models to analyzed specific issues concerning natural waters & wastewaters,
 4. Encode model algorithms into common software packages,
 5. List limitations and assumptions of classic and self-formulated models.

CE 559 Course Outline

(tentative) periods

I. Introduction and Basic Concepts	1
a. Units	
b. Mass (and Thermal) Balances	
c. Transport	
d. Applications	
II. Reactions	2-8
a. Reaction Order and Rate Constants	
b. Simple Systems and Applications	
c. Complex Systems and Applications	
d. Statistics	
III. Completely Mixed Systems	9-12
a. Basic Equations and Applications (lakes)	
b. Units in Series and Applications (streams)	
IV. Advective Systems	13-16
a. Basic Equation	
b. Streeter - Phelps BOD-DO	
V. Advective - Dispersive Systems	17-21
a. Basic Equation	
b. Applications	
VI. Advanced Topics	22-30
a. Existing Models	
b. Class Evaluation of Models, or	
c. Other	