

Reminder: Syllabi are to be used to evaluate general content, are not binding, and may / may not include updates for the upcoming semester.

CE 8923. Water Quality Modeling Fall2010

General

Instructor: James L. Martin, Ph.D., P.E., D. WRE, F. ASCE
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325-7194
Office Hours: MWF 8:00AM-5:00PM

Description: (Prerequisite: Consent of instructor). This course will provide graduate students with a comprehensive overview of methods used in the water quality modeling of conventional and toxic pollutants.

Textbook: Chapra, Steven C. 1997. Surface Water-Quality Modeling. Waveland Press, II. 844 pp.

Reference:

1. Thomann, R.V. and J.A. Mueller. 1987. Principles of Surface Water Quality Modeling. Harper-Collins. 644 pp.
2. Martin, J.L. and S.C. McCutcheon. 2000. Hydrodynamics and Transport for Water Quality Modeling. Lewis Publishers, Boca Raton, Fl., 794 pp.

Course Outline

- I. Introduction
- II. Completely Mixed Systems
 - A. Reaction Kinetics
 - B. Mass Balance, Steady-State Solutions
 - C. Particular Solutions
 - D. Feed-forward System of Reactors
- III. Incompletely Mixed Systems
 - A. Diffusion
 - B. Distributed Systems (Steady-State)
 - C. Distributed Systems (Time-Variable)
 - D. Control-Volume Approach : Steady-State Solutions
 - E. Time-Variable Solutions
- IV. Water Quality Environments
 - A. Rivers and Streams
 - B. Estuaries
 - C. Lakes and Reservoirs
 - D. Sediments
 - E. The "Modeling" Environment
- V. Dissolved Oxygen and Pathogens

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- A. BOD and Oxygen Saturation
 - B. Gas Transfer
 - C. Nitrogen Transformations
 - D. Photosynthesis and Respiration
 - E. Sediments
 - F. Pathogens
- VI. Eutrophication and Temperature
- A. Heat Budgets and Stratification
 - B. The Eutrophication Problem and Nutrients
 - C. Plant Growth
 - D. Food-chain interactions
- VII. Chemistry
- A. Equilibrium Chemistry
 - B. Coupled Equilibrium Chemistry and Mass Balance
 - C. pH Modeling
- VIII. Toxics
- A. Introduction
 - B. Mass Transfer Mechanisms: Sorption and Volatilization
 - C. Reaction Mechanisms: Photolysis, Hydrolysis, Biodegradation
 - D. Radionuclides
 - E. Metals
 - F. Toxicants/Food Chain Interactions

Grading:

Tests (2-3)	50%
Homework (35%), special assignments/projects (15%)	50%

Grading criteria:

- Individual problems from homework assignments; potential pop-quizzes will count equally for homework.
- Homework submitted after announced due date will not be graded unless prior arrangements made
- A special project will be required, consisting of a Power Point presentation (to be turned in but not given) and a research paper on a topic based upon student interest and consent of instructor.

Assessment

Average	Grade
90 – 100	A
80-89	B
70-79	C
60-69	D
< 60	F

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Policies

Academic honesty is a basic requirement and academic misconduct will be handled in accordance with guidelines and procedures outlined in the Academic Misconduct Policy, which may be accessed on the web at: <http://www.msstate.edu/dept/audit/1207A.html>

Please note especially that:

- Plagiarism is forbidden (students are expected to understand plagiarism and how to avoid it). See http://www.engr.msstate.edu/current_students/technical_communications_program/tcp/plagiarism.htm)
- Students are encouraged to collaborate on assignments, with the understanding that collaboration consists of exchanging ideas and helping each other, not copying what someone else has already done.
- Collaboration of any kind on exams is prohibited .

Students are expected to use the WebCT class web page and email to stay abreast of course events and requirements.

The instructor will communicate with students outside of class by Web CT announcements and email. Email will be addressed to each student's official MSU email address unless other arrangements have been made.