SYLLABUS

1. Number and Name: 11:375:423/523 – ENVIRONMENTAL FATE & TRANSPORT

2. Credits and contact hours: 3 credits, 2-80 min. lecture periods per week

3. Instructor: Christopher G. Uchrin

4. Text: *Environmental Modeling,* Schnoor, Wiley, 1996.
Reference: *Sediment Flux Modeling,* DiToro, Wiley, 2001

5. Specific Course Information

a. Catalog Description: *The fate and transport of chemicals to determine chemical exposures in aquatic systems and predict future conditions. Emphasis on water quality problems introduced by addition of nutrients, metals, and toxic organic chemicals to water, soil, and air.*

b. Prerequisites: Calculus II (640:136 or 640: 152), Physical Principles of Environmental Sciences (375:203) or Numerical Methods (375:303)

c. Course Type: Required

6. Course Goals

a. Specific Instructional Outcomes: Students will be versed in the principles of mathematically modeling the transport and fate of substances in aquatic ecosystems. Student problem solving skills will be enhanced through the use of homework projects involving the employment of considerable analytical skills. Student research and communication skills will be refined by a research poster requirement.

b. Specific Student Outcomes addressed by the course include:

a. Ability to apply knowledge of mathematics, science and engineering (also *contributes substantially* to the Environmental Science Undergraduate Program's Learning Goal 1. Apply knowledge from the sciences and mathematics to environmental problems and solutions).

Instructional Activity: Successful completion of five homework assignments requiring synthesis of classroom material (theory) and application to practical problems

Assessment Activity: Instructors grades and hands back each submitted assignment and presents and discusses correct solutions in class

d. Ability to function on multidisciplinary teams (also *contributes substantially* to the Environmental Science Undergraduate Program's Learning Goal 4. Function effectively on multidisciplinary teams).

Instructional Activity: Team research project resulting in poster session. Engineers must pair-up with scientists in class

Assessment Activity: Instructor and other members of faculty evaluate posters and students' discussion and complete a poster evaluation form.

g. Ability to communicate effectively (also *contributes substantially* to the Environmental Science Undergraduate Program's Learning Goal 5. Communicate technical information effectively [orally, in writing, and through electronic media]).

Instructional Activity: Presentation of course required research results in a class poster session

Assessment Activity: Instructor and other members of faculty evaluate posters and students' discussion and assess performance using an evaluation form

7. Topics:

Lecture	Topic
1, 2	Introduction to Environmental Models (Schnoor, Chapter 1)
3 - 6	Environmental Transport Phenomena, Mass Balances (Schnoor, Ch. 2)
7– 10	Reaction Kinetics and Equilibria (Schnoor, Chapter 3)
11 – 14	Eutrophication: Causes, Limiting Nutrients, Models (Schnoor, Chapter 5)
15	First Exam
16 – 18	Conventional Pollutants in Rivers: Extended Streeter-Phelps Analysis, Food Web Models (Schnoor, Chapter 6)
19 – 22	Groundwater Pollution: Hydraulics, Transport, Reactions and Sorption, Sources/Sinks, Models (Schnoor, Chapter 9)
23 – 24	Pharmacokinetic Modeling
25	Atmospheric Deposition (Schnoor, Chapter 10)

26	Sediment Toxicity Modeling (DiToro, Chapter 2)	
27	Second Exam	
28	Student Poster Presentations	
Grading:	Homework	20%
	Student Poster	20%
	Mid Term Exam	30%
	End Term Exam	30%
Prepared by:	Christopher Uchrin	09/03/12