

1. CEE 4450 (5450) - Water Quality Modeling
2. Course credit hours: 3
Contact hours per week: 3
Credit category: Engineering Topics
3. Course coordinator: Lenly Weathers
4. Textbook: Surface Water Quality Modeling, Chapra, Waveland Press.
5. Course information:

2020 Catalog description	Mathematical modeling of chemical and biological processes occurring in streams, lakes, and estuaries, emphasizing oxygen demand and nutrient processes.
Prerequisite(s) or Concurrent Enrollment	CHEM 1120 and CEE 3413 or consent of instructor
Course type	Selected Elective

6. Course instructional outcomes:

Course Outcome No.	Course Outcome (CO)	ABET Student Outcome
CO1	Demonstrate an understanding of the processes (reaction kinetics, reactor theory, transport processes, etc.) that impact the fate and transport of pollutants in naturally-occurring reactors	1
CO2	Develop the ability to numerically model fate and transport processes in natural reactors	1, 7
CO3	Learn to apply and evaluate commonly used water quality models	1, 7

ABET criterion 3 Student Outcomes addressed by this course:

SO No.	Student Outcome (SO)
3.1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
3.7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

7. Course topics:
 1. Physical, chemical and biological characteristics of water
 2. Stoichiometry, reaction kinetics and material balances

3. Mathematical modeling of physical systems
4. Movement of contaminants in the environment
5. Water quality in rivers
6. Water quality in lakes and reservoirs
7. Water quality in groundwater systems

Program criteria (curriculum) addressed by this course:

1. Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of basic science
 2. Analyze and solve problems in at least four technical areas appropriate to civil engineering
8. Additional topics, assignments, or requirements for dual-level (4000/5000) course:
Graduate students are required to pursue the above topics in more depth.
9. Date: 07/15/2020