

1. CEE 4430 (5430) – Water and Wastewater Engineering
2. Course credit hours: 3  
Contact hours per week: 3  
Credit category: Engineering Topics
3. Course coordinator: Tania Datta
4. Textbook: Water and Wastewater Engineering, Professional Edition; Davis, 2010.

Supplemental materials: Tennessee Department of Environment and Conservation Design Criteria (provided as handouts)

5. Course information:

2020 Catalog description	To integrate the application, analysis and synthesis levels of cognitive engineering development as they relate to water and wastewater treatment. This will be accomplished through the study of water and wastewater treatment unit processes and design.
Prerequisite(s)	CHEM 1120 and CEE 3413
Course type	Selected Elective

6. Course instructional outcomes:

Course Outcome No.	Course Outcome (CO)	ABET Student Outcome
CO1	Correlate the characteristics of water supplies with selection of appropriate water treatment unit processes	1, 2
CO2	Illustrate the principles associated with carbon dioxide, iron and manganese removal from groundwater and design the unit process	1, 2
CO3	Illustrate the principles associated with coagulation and flocculation of particles and design the unit processes	1, 2
CO4	Illustrate the principles associated with sedimentation of particles created during the treatment of water and design the unit process.	1, 2
CO5	Design granular media and membrane filtration technology	1, 2
CO6	Illustrate the principles associated with the disinfection using chlorine, and design the unit processes	1, 2
CO7	Correlate the requirements of NPDES permits with the selection of appropriate wastewater treatment unit processes	1, 2
CO8	Illustrate the principles associated with preliminary and primary wastewater treatment and design the unit processes	1, 2
CO9	Illustrate the microbiological processes occurring during biological wastewater treatment	1, 2
CO10	Design unit processes to facilitate suspended growth biological wastewater treatment	1, 2

Course Outcome No.	Course Outcome (CO)	ABET Student Outcome
CO11	Design secondary clarifier unit processes that integrate with biological wastewater treatment unit processes.	1, 2

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
3.2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

8. Course topics:

1. Water supply source characteristics
2. Water treatment to remove iron and manganese from groundwater
3. Water treatment to remove particles by coagulation and flocculation
4. Removal of particles created during water treatment by sedimentation
5. Removal of particles by granular media and membrane filtration
6. Disinfection of treated portable water
7. Wastewater sources and National Pollutant Discharge Elimination System permits
8. Wastewater flow and waste load determination
9. Preliminary and primary treatment of wastewater
10. Wastewater microbiology
11. Suspended growth biological wastewater treatment processes
12. Secondary clarification during wastewater treatment

9. 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. Apply knowledge of four technical areas appropriate to civil engineering
3. Design a system, component, or process in at least two civil engineering contexts

10. Additional topics, assignments, or requirements for dual-level (4000/5000) course:

N/A

11. Date: 07/13/2020