

Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 4430 (5430) – Water and Wastewater Engineering
Elective
Spring Semester 2008

- 2007 Catalog Data: CEE 4430 (5430): Water and Wastewater Engineering Lecture 3. Credit 3.
Prerequisite: CEE 3410 or consent of instructor. Analytical methods for use in water quality management of streams, lakes, reservoirs and groundwater systems. Project design of water and wastewater treatment plants.
- Textbook: Reynolds, T.D. and Paul A. Richards, *Unit Operations and Processes in Environmental Engineering*, PWS Publishing Company, Boston, Second Edition, 1996.
- Reference: Droste, R.L., *Theory and Practice of Water and Wastewater Treatment*, Wiley, 1997.
Viessman, W. Jr. and Hammer, M.J., *Water Supply and Pollution Control*, Harper Collins, 7th Ed., 2004.
- Coordinator: L.J. Weathers, Associate Professor of Civil Engineering
- Goal: The goal of CEE 4430 (5430) “Water and Wastewater Engineering” is to develop the student’s ability to design potable water and wastewater treatment systems.

Course learning objectives:

1. Develop a working knowledge of environmental engineering practice in the area of potable water treatment.
2. Develop the ability to perform basic design of the unit operations and processes that are used in potable water treatment.
3. Develop an understanding of legislation pertinent to potable water treatment.
4. Develop a working knowledge of environmental engineering practice in the area of wastewater treatment.
5. Develop the ability to perform basic design of the unit operations and processes that are used in wastewater treatment.
6. Develop an understanding of legislation pertinent to wastewater treatment.

Course measurable outcomes:

Students will be expected to:

1. draw a diagram of a conventional potable water treatment system and explain the purpose of each component of the system;
2. list important water quality characteristics and explain how each impacts the design of treatment systems;
3. calculate the required parameters in the design of processes for water treatment;
4. draw a diagram of a conventional wastewater treatment plant and explain the purpose of each component of the system;
5. list important wastewater characteristics and explain how each impacts the design of wastewater treatment systems; and
6. calculate the required parameters in the design of processes for wastewater treatment.

Topics covered: (Two lectures per week, 80 minutes each)

1. Chemistry review (1 class)
2. Reactor theory (1 class)
3. Water and wastewater quantity and quality (1 class)
4. Water and wastewater treatment overview (1 class)
5. Water treatment processes and design (10 classes)
6. Wastewater treatment processes and design (9 classes)

7. Solids handling (1 class)
8. Tests/review (4 class)

Contribution of the course to meeting professional component:

This course is a part of engineering topics of the curriculum. It is an elective course with significant design content.

ABET category content as estimated by faculty member who prepared this course description:

Engineering Science: 1 credit or 33%
 Engineering Design: 2 credits or 67%

Relation of course to program outcomes:

- Outcome 1: The graduates will have a broad understanding of the relevant principles of mathematics, science, and engineering.
- Outcome 2: The graduates will have a general comprehension of four technical areas appropriate to civil engineering.
- Outcome 4: The graduates will be capable of design activities and have the ability to identify, formulate, and solve civil engineering problems.
- Outcome 8: The graduates will have the ability to use techniques, skills, and modern engineering tools needed for engineering practice.

Relation of course to ABET Criteria:

<u>General Criteria</u>	Bloom's Level of Achievement
(3a) Knowledge of math, science and engineering	3
(3c) Design a system, component or process	5
(3e) Identify, formulate, and solve engineering problems	3
(3k) Techniques, skills, modern tools for engineering practice	3

<u>Program Criteria</u>	Bloom's Level of Achievement
1. Apply knowledge of math and sciences	3
2. Apply knowledge of four technical areas appropriate to civil engineering	3
3. Design a system, component, or process in more than one civil engineering context.	5
4. Explain the importance of professional licensure	2

Computer usage:

1. Use spreadsheets to solve process analysis problems and system design problems.

Laboratory projects: A project to enhance knowledge of coagulation, flocculation and settling.

Prepared by: L.J. Weathers

Date: October 2007