Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 3413 – Environmental Engineering
Required
Fall Semester 2009, Spring Semester 2010

Fundamental mathematical, chemical, biological, and physical principles of environmental engineering. Focuses on water quality, water supply and treatment and wastewater treatment. Prerequisites: CHEM 1120, MATH 2110.


Reference: None

Coordinator: L.J. Weathers, Associate Professor of Civil Engineering

Goal: Students will learn fundamental mathematical, chemical, biological and chemical principles used in the design and analysis of environmental engineering systems.

Course learning objectives:
1. The student is to demonstrate their understanding of standard environmental quality parameters.
2. The student is to demonstrate their knowledge of the major environmental regulations.
3. The student is to demonstrate their ability to apply the fundamental mathematical, chemical, biological, and physical principles used in the design and analysis of environmental engineering systems.

Course measurable outcomes:
Students will be expected to:
1. list the major environmental regulations of the United States;
2. know what environmental parameters are used for specific environmental systems and how these parameters are determined;
3. know the major unit processes used in water and wastewater treatment;
4. know the basic approach to the design of water and wastewater treatment processes;
5. know how solid and hazardous waste are disposed; and
6. know the cause of air pollution and some of the major air treatment processes.

Topics covered (three lectures per week, 55 minutes each):
1. Overview, environmental regulations and units (3 classes)
2. Reactor theory, material balances and energy balances (6 classes)
3. Water treatment (11 classes)
4. Water quality engineering (6 classes)
5. Wastewater engineering (7 classes)
6. Air quality and pollution control (2 classes)
7. Noise pollution (1 class)
8. Solid and hazardous waste engineering (2 classes)
9. Global climate change (1 class)
10. Tests (3 classes)

Contribution of the course to meeting professional component:
This course is a part of engineering topics of the curriculum.

ABET category content as estimated by faculty member who prepared this course description:
Engineering Science: 2.0 credits or 67%
Engineering Design: 1.0 credits or 33%
Relation of course to program objectives:
Objective 1: The educational program provides and delivers a broad understanding of relevant principles of mathematics, science, and engineering.
Objective 2: The educational program offers a general comprehension of the breadth of civil engineering and in-depth knowledge of at least one major civil engineering area.
Objective 4: The educational program requires that students are taught design activities throughout the professional component of the civil engineering curriculum and will have the ability to identify, formulate, and solve civil engineering problems.
Objective 8: The educational program develops the students’ ability to use techniques, skills, and modern engineering tools needed for engineering practice.
Objective 11: The educational program maintains an environment to carry out fundamental and applied research and advance engineering knowledge through research.

Relation of course to ABET Criteria:

General Criteria

<table>
<thead>
<tr>
<th>Description</th>
<th>Bloom’s Level</th>
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<tbody>
<tr>
<td>(3a) Knowledge of math, science, engineering</td>
<td>3</td>
</tr>
<tr>
<td>(3c) Design a system, component, or process</td>
<td>3</td>
</tr>
<tr>
<td>(3e) Ability to identify, formulate, and solve engineering problems</td>
<td>3</td>
</tr>
<tr>
<td>(3i) Recognition of the need for, and ability to engage in life-long learning</td>
<td>2</td>
</tr>
<tr>
<td>(3k) Techniques, skills, and modern engineering tools for engineering practice</td>
<td>3</td>
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</tbody>
</table>

Program Criteria

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<thead>
<tr>
<th>Description</th>
<th>Bloom’s Level of Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apply knowledge of math and sciences</td>
<td>3</td>
</tr>
<tr>
<td>2. The ability to perform civil engineering design</td>
<td>4</td>
</tr>
<tr>
<td>3. Proficiency in a minimum of four civil engineering areas.</td>
<td>3</td>
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Computer usage: Homework assignments will require use of Microsoft Excel

Laboratory projects: None

Prepared by: L.J. Weathers

Date: February 2010