

Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 4410 (5410) – Solid and Hazardous Waste Management
Elective
(Not offered 2007-2008)

2007 Catalog Data:	CEE 4410 (5410): Solid and Hazardous Waste Management. Lecture 3. Credit 3. The collection and disposal of solid wastes. Treatment and disposal technologies of hazardous wastes. Prerequisite: CEE 3420 or consent of instructor.
Textbook:	Tchobanoglous, Theisen and Vigil, <i>Integrated Solid Waste Management</i> , McGraw-Hill, 1993 LaGrega, Buckingham, and Evans, <i>Hazardous Waste Management</i> , McGraw-Hill, 1994.
Reference:	None
Coordinator:	L. Weathers, Associate Professor of Civil and Environmental Engineering
Goal:	The goal of CEE 4410 (5410) “Solid and Hazardous Waste Management” is to build upon basic environmental engineering skills as produced in CEE 3410 “Introduction to Environmental Engineering” and basic hydraulic and hydrological skills as produced in CEE 3420 “Hydraulic Principles” and to learn the basic principles of solid waste management and hazardous waste management.

Course learning objectives:

1. The student is to become knowledgeable in the area of integrated solid waste management.
2. The student is to become knowledgeable in the area of waste collection and movement.
3. The student is to become knowledgeable in the area of ultimate disposal via landfills and post-filling monitoring.
4. The student is to become knowledgeable of hazardous waste regulation.
5. The student is to become knowledgeable of fate and transport of hazardous wastes.
6. The student is to become knowledgeable of toxicology and risk assessment principles.
7. The student is to become knowledgeable of physical/chemical processes for hazardous waste treatment.
8. The student is to become knowledgeable of incineration methods for hazardous waste treatment.

Course measurable outcomes:

Homework will be assigned to assess each objective. Test problems will assess the competency of students on each objective.

Students will be expected to:

1. know the basic laws and regulations pertaining to integrated solid waste management;
2. know the basic laws and regulations pertaining to hazardous waste regulation;
3. understand the basic principles of waste collection, movement and transfer;
4. understand the basic principles of landfilling of municipal solid wastes;
5. understand the basic principles of fate and transport of hazardous wastes;
6. understand the basic principles of toxicology and risk assessment;
7. understand the basic principles of physical/chemical treatment of wastes;
8. understand the basic principles of incineration of wastes; and
9. have some capability for design relating to these topics.

Topics covered: (Three lecture classes per week, 55 minutes each)

1. Introduction to solid waste management (1 hour)
2. Solid waste legislation and regulation (3 hours)
3. Generation of solid wastes (3 hours)
4. Onsite handling, storage and processing (1 hour)
5. Design of collection systems (4 hours)

6. Transfer and transport (1 hour)
7. Processing techniques and equipment (3 hours)
8. Recovery of resources (3 hours)
9. Sanitary landfill design (3 hours)
10. Hazardous waste laws and regulations (1 hour)
11. Environmental movement and fate of hazardous substances (5 hours)
12. Toxicology and epidemiology (1 hour)
13. Risk assessment (2 hours)
14. Treatment technologies (5 hours)
15. Disposal technologies (3 hours)
16. Tests (3 hours)

Contribution of the course to meeting professional component:

This course is a part of engineering topics of the curriculum and is an elective.

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

Engineering Science: 2.5 credits or 83%
 Engineering Design: 0.5 credits or 17%

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, engineering	3
(3c) Design a system, component, or process	4
(3e) Identify, formulate, and solve engineering problems	3
(3k) Techniques, skills, and 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	4
3. Design a system, component or process in more than one civil engineering context	4

Computer usage: Spreadsheet analysis of waste systems; use EPA HELP model

Laboratory projects: None

Prepared by: L. Weathers

Date October 2007