

**Hazardous Waste Management  
ENVE 625  
Spring 2009**

COURSE NUMBER: ENVE 625

Credit Hours: 3

INSTRUCTOR: Mike Egnor

Office: (xxx) xxx-xxxx ext. xxxx (XXXXXXXXXXXXXXXXXXXXXXXXXX)

Cell: (xxx) xxx-xxxx (XXXXXXXXXXXXXXXXXXXXXXXXXX)

Course Time: Thursday 4:00 – 6:20 pm

Course Location: South Charleston GC134, Huntington SH 263

**COURSE DESCRIPTION**

This course will examine the management of hazardous waste. It covers the following topics:

- Options and methods of managing hazardous waste
- Landfill design, testing, operation, monitoring, and closure
- Incinerator design, testing, operation, and monitoring
- Design and operation of treatment facilities
- Waste reduction practices

The options and methods of managing hazardous waste will examine:

- Subsurface Containment Techniques
- Extraction Processes
- Adiabatic Treatment Methods
- Biotic Treatment Methods
- Stabilization Methods

Other topics covered by this course include:

- Examination of Hazardous Waste Laws and Regulations
- Fate and Transport of Hazardous Waste
- Risk Assessment and Toxicology of Hazardous Waste

**PREREQUISITES:** Degree in Science or Engineering; or consent of the instructor

**RATIONAL AND GOALS**

The class will provide the student the relevant information and background to understand, design, and operate the various types of hazardous waste treatment options available today. Regulations, properties fate and transport of contaminants, and toxicology will also be presented to help the student understand the mechanisms of hazardous waste management. Students successfully completing the course will understand how to select the most effective hazardous waste treatment methods, and the proper operation and design of the treatment technologies.

**Course Objectives and Competencies**

1. Students are expected to be able to understand, apply, and evaluate hazardous waste laws and other environmental regulations related to hazardous waste.

2. Students are expected to be able to demonstrate an understanding of the properties, fate, and transport of hazardous waste.
3. Students are expected to exhibit a familiarity with the key concepts of toxicity, including the cancer causing potential of chemicals and how we measure them, as well as demonstrate an understanding of risk assessment, risk management, and risk communication.
4. Students are expected to be able to understand the different options and methods of treating hazardous waste. This includes, but is not limited to, incineration design, operation, testing, and monitoring.
5. Students are expected to be able to understand the elements of hazardous waste landfill design, testing, operation, monitoring, and closure.

### Class Schedule and Topic Outline

Class	Description	Chapter
<b>Class 1</b> <b>1/15/09</b>	<b>Introduction and Class Set-up</b> Introduction to Hazardous Waste History of Hazardous Waste	<b>1</b>
<b>Class 2</b> <b>1/22/09</b>	<b>Hazardous Waste Regulations</b> Discussion of CERCLA Discussion of RCRA	<b>2</b>
<b>Class 3</b> <b>1/29/09</b>	<b>Fate, Transport, and Toxicology of Hazardous Waste</b> Fate and Transport of Hazardous Waste Risk Assessment Toxicology of Hazardous Waste	<b>4-5, 14</b>
<b>Class 4</b> <b>2/5/09</b>	<b>Subsurface Containment Techniques</b> Vertical Containment Horizontal Containment <b>Extraction Processes</b> Pump and Treat Soil/Vapor Extraction	<b>16</b>
<b>Class 5</b> <b>2/12/09</b>	<b>Adiabatic Processes</b> Air Stripping Steam Stripping Carbon Adsorption Thermal Desorption Neutralization Chemical Oxidation Membrane Processes	<b>9</b>
Exam #1		
<b>Class 6</b> <b>2/19/09</b>	<b>Biotic Treatment Processes</b> Bioremediation	<b>10</b>
<b>Class 7</b> <b>2/26/09</b>	<b>Biotic Treatment Processes (Continued)</b> Phytoremediation Natural Attenuation	<b>10</b>
<b>Class 8</b> <b>3/5/09</b>	<b>Stabilization Processes</b> Solidification and Stabilization Vitrification	<b>11</b>

		Other types of Stabilization Processes	
<b>Class 9</b> <b>3/12/09</b>	<b>Incineration</b> Types Design Testing Operation Monitoring	Exam #2	<b>12</b>
<b>Class 10</b> <b>3/19/09</b>	<b>Facility Development and Operations</b> Facility Types Facility Operations Needs Assessment Site Selection		<b>8</b>
<b>3/26/09</b>	<b>Spring Break (No Class)</b>		
<b>Class 11</b> <b>4/2/09</b>	<b>Landfill Design</b> Design Testing Operation Monitoring Closure		<b>13</b>
<b>Class 12</b> <b>4/9/09</b>	<b>Field Trip</b>		
<b>Class 13</b> <b>4/16/09</b>	<b>TBD</b>		
<b>Class 14</b> <b>4/23/09</b>	<b>Waste Reduction Practices</b> General Considerations Management Strategies Life Cycle Analysis Volume and Toxicity Reduction Recycling		<b>7</b>
<b>4/30/09</b>	<b>Dead Week (No Class)</b>		
<b>Class 15</b> <b>5/7/09</b>	<b>Final Exam</b>		

Required text: Michael D. LaGrega, 2001. 2<sup>nd</sup> Edition. Hazardous Waste Management. McGraw-Hill. New York, NY.

Class will consist of a Field Trip, Lectures using PowerPoint Presentations, Class Discussion.

## **Attendance/Grades**

Students are expected to attend and participate in class. Any unexcused absences after the first 2 will result in a 1.5% loss of the total overall grade. Any late work will result in a 10% loss per day.

### **Grading Scale:**

A	90%-100%
B	80%-89%
C	70%-79%
D	60%-69%

### **Grades:**

Participation/Homework	10%
Exam #1	30%
Exam #2	30%
Final	30%

## **Students with Disabilities**

Students with disabilities who require special accommodations should see the following link:

<http://www.marshall.edu/disabled>

## **Academic Dishonesty**

Students should see the applicable section of the Graduate Catalogue that explains academic dishonesty.

## **Nondiscrimination Policy**

Students should see the applicable section of the Graduate Catalogue that explains the nondiscrimination policy.

## **University Computing Services Acceptable Use Policy**

Students should see the following link regarding university computing services acceptable use policy:

<http://www.marshall.edu/ucs/CS/accptuse.asp>

## **Inclement Weather Policy**

Students should see the following link regarding inclement weather policy:

[http://www.marshall.edu/www/policy/policy\\_07.html](http://www.marshall.edu/www/policy/policy_07.html)