

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS

**INTRODUCTION TO HAZARDOUS WASTE DISPOSAL**  
**ENV 1500**

**Class Hours: 3.0**

**Credit Hours: 3.0**

**Laboratory Hours: 0.0**

**Date Revised: Fall 01**

**Catalog Course Description:**

Identification of principal hazardous waste materials, types, and processes for recovery, destruction, and disposal of hazardous wastes. Sampling and analysis of waste materials. Toxic and other hazardous properties of wastes. Inventory control and discharge records for hazardous waste disposal waste minimization.

**Entry Level Standards:**

High school diploma or equivalent, with at least one year of algebra.

**Prerequisites:**

None

**Textbook(s) and Other Reference Materials Basic to the Course:**

*Hazardous Materials, Substance and Waste Compliance Guide.* Robert J. Keegan IV, Robert J. Keegan.

**I. Week/Unit/Topic Basis:**

<b>Week</b>	<b>Topic</b>
1	Airborne Pollutants: Identities, Physical Properties, Chemical Properties
2	Airborne Pollutants: Concentrations, Air Quality Standards, Emission Standards
3	TEST; Removal of Dusts by Filtration; Removal of Dusts by Electronic Precepitators
4	Pollutants Removal by Scrubbing; Pollutants Removal by Absorption; Pollutant Disposal by Dilution in Air
5	Pollutant Removal Efficiency of Integrated Gas Cleaning Systems; TEST; Waste Vapors Recovery by Condensation
6	Combustible Liquid and Vapor Destruction by Incineration; Flue Gas Flow Rate Measurement, Pitot Tubes; Flue Gas Sampling Points Requirements
7	EPA Sampling Methods I, II; TEST
8	Analytical Methods for Inorganic Elements, Organic Compounds; Biochemical Oxygen Demand Analysis

9	Water Pollutants: Identities, Properties, Effects on Aquatic Life
10	TEST; Primary Treatment of Wastewaters; Secondary Treatment of Wastewaters I
11	Secondary Treatment of Wastewaters II; Tertiary Treatment of Wastewaters; Wastewater Sludge Treatment and Disposal
12	TEST; Radioactivity: Kinds, Amounts
13	Radioactive Decay Chains; Radioactive Contamination and Radiation Hazards and Standards; Radioactivity Detection Instruments
14	Radioactivity Decontamination Methods; TEST; Asbestos Hazards, A Special Case
15	Waste Minimization: Identification, Methods, Economics
16	Comprehensive Final Examination

## II. Course Objectives\*:

- A. Identify the typical gaseous pollutants generated by industrial processes, and to relate those pollutants to regulatory limits on their discharge concentration and emission rates. I
- B. Identify the usual process operations for removing the pollutants in typical industrial gaseous wastes, and specify some of the operating parameters needed to meet governmental emission standards. IV
- C. Identify EPA-approved sampling and analytical methods for determining pollutant concentration. IV
- D. Identify typical dissolved pollutants in industrial, agricultural, and domestic wastewaters, and the related processing operations for their removal. IV
- E. Understand the origin and hazards of radioactive contamination and radiation, and to relate those effects to instrumental detection, to decontamination, and to regulatory standards. IV
- F. Identify ways to minimize waste production and processing requirements in existing waste systems. IV

\*Roman numerals after course objectives reference goals of the CHT program.

## III. Instructional Processes\*:

Students will:

1. Prepare short research papers. *Communication Outcome, Information Literacy Outcome*
2. Participate in classroom discussions which challenge the student' ability to think creatively and visualize complex spatial relationships. *Communication Outcome, Active Learning Strategy, Problem Solving and Decision Making Outcome*
3. Emphasize individual and corporate environmental relationships in written assignments and discussions. *Communication Outcome, Personal Development Outcome, Transitional Strategy*

\*Strategies and outcomes listed after instructional processes reference Pellissippi State' s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the

classroom, and encouraging students to take active and responsible roles in the educational process.

#### **IV. Expectations for Student Performance\*:**

Upon successful completion of this course, the student should be able to:

1. Identify the common atmospheric pollutants. A
2. Understand governmental air quality and emission standards for atmospheric pollutants. A
3. Relate emission standards to air quality standards via dilution factors. C
4. Identify the major process operations for gaseous pollutants removal. A
5. Explain the functioning of the major components of gas cleanup systems. B
6. Specify performance requirements for gas cleanup systems. A
7. Calculate the theoretical capacity of fixed-bed absorbers. C
8. Specify the number and the spacing of sampling and flow measurement points need in waste gas streams. C
9. Specify typical operating temperatures and flow rates for incineration of typical organic vapor pollutants. A
10. Understand the roles of catalysts and catalyst poisoning in incineration. A
11. Predict recovery efficiency of condensation processes for organic vapor recovery. A, B
12. Predict recovery efficiency of particle removal process with respect to particle size. B
13. Understand the relation of dissolved oxygen in water to aquatic ecology. D
14. Understand the relation of biochemical oxygen demand to dissolved oxygen in water. D
15. Calculate the theoretical maximum biochemical oxygen demand of typical organic pollutant compounds. D
16. Identify special pollutants, which interfere with normal wastewater biopurification processes. F
17. Understand the actions and needs for tertiary wastewater treatment. D
18. Identify the methods and alternatives for anaerobic sludge digestion and disposal. C

\*Letters after performance expectations reference the course objectives listed above.

#### **V. Evaluation:**

##### A. Testing Procedures:

Seven one-hour (50 minute) written tests will be given. A written, two-hour comprehensive final examination will be given at the end of the course. Each one-hour test has equal weight. The final examination has the weight of two tests in calculating the course grade. The two lowest grades among the homework average and the test grades will be dropped when calculating the course average grade. Students whose test grades are above 90% in all cases

are excused from the final examination and will be given a course grade of "A".

B. Laboratory Expectations:

N/A

C. Field Work:

N/A

D. Other Evaluation Methods:

Homework will be assigned and graded. The average of all homework assignments has the weight of one test.

E. Grading Scale:

90 - 100	A
87 - 89	B+
80 - 86	B
77 - 79	C+
70 - 76	C
60 - 69	D
Below 60	F

**VI. Policies:**

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

B. Academic Dishonesty:

Cheating on a test will result in that test being assigned a grade of zero (0). A second instance of cheating will result in dismissal from the course with a course grade of "F".