

**COURSE OUTLINE**  
**CET 124 Plumbing and Waste Neutralization**  
**2 Credit Hours**

**Course Description:**

This course provides instruction on the basic components and sequence of operations of plumbing systems used to treat waste generated in industrial or critical environments.

**Prerequisite(s):**

**Purpose of Course:** The purpose of this course is to prepare students to work with plumbing and waste treatment systems in industrial or critical environments.

**Required Materials**

**Textbooks:** Selected Chapter (ch 9). Green, Gosse. 2010. *Industrial Maintenance* 3<sup>rd</sup> ed. ATP. ISBN: 978-0-8269-3641-7  
ATP Staff. 2008. *Building Automation Control Devices and Applications*. ATP. ISBN: 978-0-8269-2000-3

**Learning Outcomes**

The intention is for the student to be able to:

1. Diagram and explain a typical plumbing flowchart for an industrial facility.
  - a. Interpret a plumbing flowchart and plumbing schematics.
  - b. Describe major components of domestic hot and potable cold-water systems.
  - c. List types of facilities that are critical environments and explain how plumbing systems can be adapted for their special needs.
  - d. Describe how systems can be configured to prevent hazardous waste from leaving without treatment.
2. List and discuss the purpose of basic components of plumbing systems in various industrial facilities.
  - a. Correctly explain how to calculate pressure drop in a plumbing system.
  - b. Correlate pump types with their best applications within plumbing systems.
  - c. Describe the benefits and typical purposes for different types of valves: gate valves, ball valves, butterfly valves, check valves, directional control valves and spool valves.
  - d. Explain the purpose of check valves in plumbing safety.
  - e. Explain how hydro-pneumatic tanks work.
3. Explain the issues surrounding waste treatment and removal in various critical environments.
  - a. List the types of waste treatment systems that might be used to pre-treat industrial and critical environment waste before it enters a sewage system.
  - b. Describe the use of digesters and heat treatment to make lab wastewater safe for external disposal.
  - c. Describe types of chemical treatment used to make wastewater safe for external disposal.
  - d. List the plumbing requirements for autoclave use.
  - e. Diagram the barrier systems that would prevent liquid waste contamination from leaving containment areas.
  - f. Diagram plumbing systems commonly used for waste treatment.
4. Describe how automation can be used to monitor and improve efficiency of plumbing systems.
  - a. Compare sensors used to control various plumbing systems.
  - b. Explain a typical control sequence for a heat treatment tank.

- c. Explain a typical control sequence for a hydropneumatic tank.
  - d. Explain a typical control sequence for a lift station.
- 5. Discuss WHO, NIH, EPA, CDC guidelines and applications to safe waste treatment.
  - a. Find federal pretreatment regulations for industrial waste disposal.
  - b. Discuss local requirements for discharge of treated waste.

### **Learning Units**

- I. Industrial Plumbing Basics
- II. Plumbing Systems Basics
- III. Critical Environment Considerations
- IV. Automation and Efficiency
- V. Regulatory Issues

### **Method of Delivery/Instruction**

☒ Face-to-Face                      ☒ Blended                      ☐ Online

Learning activities will be assigned within and outside the classroom or online to assist the student to achieve the intended learning outcomes through lecture, Instructor-led class discussion, hands-on experiences, and others at the discretion of the instructor.

### **Method of Grading and Evaluation**

The student will be graded on learning activities and assessment tasks. Grade determinants may include the following: daily work, quizzes, chapter or unit tests, comprehensive examinations, student projects, student presentations, class participation or forum posts, and other methods of evaluation employed at the discretion of the instructor.