

## Course Number and Title: ENV 215 OSHA Hazardous Waste Operations

**Campus Location:**

Stanton

**Effective Date:**

2022-51

**Prerequisite:**

CHM 110

**Co-Requisites:**

None

**Course Credits and Hours:**

2.00 credits

2.00 lecture hours/week

1.00 lab hours/week

**Course Description:**

This course provides simulation and hands-on exercises as they relate to hazardous materials and hazardous waste.

**Required Text(s):**

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

**Additional Materials:**

None

**Schedule Type:**

Classroom Course

**Disclaimer:**

Upon successful completion, students are awarded the 40- hour Occupational Safety and Health Administration (OSHA) certification.

**Core Course Performance Objectives (CCPOs):**

1. Explain all federal regulations dealing with Occupational Safety and Health Administration (OSHA) hazardous waste considerations, including 29 Code of Federal Regulations (CFR) 1910.120. (CCC 1, 2, 4, 6; PGC EET 1)
2. Differentiate between the various aspects of medical surveillances, monitoring, hazard controls, exposure routes, and exposure symptoms. (CCC 1, 2, 6; PGC EET 1)
3. Explain the chemical and physical nature of hazardous chemicals: their characteristics, reactions, and classifications schemes. (CCC 1, 2, 6; PGC EET 1)
4. List the health hazards, conditions, symptoms, and monitoring requirement situations involving oxygen deficiency, cold and heat exposure, and biological hazards. (CCC 1, 2, 4, , 6; PGC EET 1)
5. Explain the major aspects of toxicology, including toxicity, lethal dose (LD50), immediately dangerous to life or health (IDLH), permissible exposure limits (PEL), reference exposure levels (REL), threshold limit values (TLV), and acute versus toxic effects. (CCC 1, 2, 4, 6; PGC EET 1, 5)
6. List both engineering controls and safe work practices used on hazardous waste sites, including confined space safety procedures. (CCC 1, 2, 4, 6; PGC EET 1)
7. List the characteristics of the major types of respiratory protective equipment and how to correctly use and work in several levels of personal protective equipment (PPE). (CCC 1, 2, 6; PGC EET 1)
8. List the main types of hazardous waste emergencies, and list federal regulations concerning required procedures and worker responsibilities in the event of an emergency. (CCC 1, 2, 4, 6; PGC EET 1)
9. Develop a full site safety plan for a hazardous waste site. (CCC 1, 2, 3, 4, 6; PGC EET 1)
10. Demonstrate professional and ethical conduct as expected in industry (CCC 1, 2, 3, 4, 6; PGC 3, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

**Measurable Performance Objectives (MPOs):**

Upon completion of this course, the student will:

1. Explain all federal regulations dealing with Occupational Safety and Health Administration (OSHA) hazardous waste considerations, including 29 Code of Federal Regulations (CFR) 1910.120.
  1. Explain the role of OSHA in protecting the health and safety of workers.
  2. List OSHA safety standards applicable to work on hazardous waste sites.
  3. List the applicable provisions of 29 CFR 1910.120.
  4. Explain the rights and responsibilities of employers and employees involved in clean-up operations on hazardous waste sites.
2. Differentiate between the various aspects of medical surveillances, monitoring, hazard controls, exposure routes, and exposure symptoms.
  1. Explain the importance of medical surveillance in safeguarding the health of hazardous waste workers.
  2. Explain the benefits to both employees and employers of full cooperation in a program of medical surveillance.

3. Explain the practical aspects behind legal requirements for medical surveillance under OSHA standards.
  4. List the potential adverse effects of overexposure to chemicals commonly encountered on hazardous waste sites.
  5. List specific medical monitoring procedures and testing protocols used in medical surveillance.
  6. List chemistry and chemicals in the workplace.
  7. Explain the need for advance planning regarding hazard avoidance and correction.
  8. List specific hazards and how to identify them.
  9. Explain the chemical and physiological basis for certain hazards.
  10. Compare both engineering and personal hazard controls.
  11. List symptoms of human illness resulting from hazards.
3. Explain the chemical and physical nature of hazardous chemicals: their characteristics, reactions, and classifications schemes.
    1. Explain the nature of atoms, molecules, ions, and compounds.
    2. Compare acids and bases.
    3. Explain the concept of pH.
    4. Explain the concept of chemical reactions.
    5. Explain atomic number, and use the periodic table.
    6. Explain the nature of organic chemical compounds.
    7. List special hazards presented by heavy metals, strong oxidizing agents, and organic monomers.
    8. Apply basic chemistry knowledge to safe practices in working with chemicals.
    9. Apply a basic chemistry vocabulary.
    10. Explain the physical properties that best characterize dangerous substances.
    11. Classify different types of chemical reactions, fires, and explosions.
    12. List some of the effects of fire on personnel.
    13. Compare rationale and general methodology behind compatibility staging, fingerprinting, and bulking operations.
4. List the health hazards, conditions, symptoms, and monitoring requirement situations involving oxygen deficiency, cold and heat exposure, and biological hazards.
    1. List normal and safe levels of oxygen in air.
    2. Predict locations where oxygen may be expected to be deficient.
    3. List monitoring and air replacing equipment used in potentially hazardous locations.
    4. Explain the weather conditions under which heat and cold stress can occur.
    5. List contributing factors to heat and cold stress.
    6. Explain how to monitor conditions and workers subject to heat and cold stress.
    7. Explain symptoms, prevention, and treatment of temperature stress response.
    8. Explain biohazards that may be present on a site and how to recognize them.
    9. Explain what responses to biohazard recognition will reduce or prevent exposure to them.
5. Explain the major aspects of toxicology, including toxicity, lethal dose (LD50), immediately dangerous to life or health (IDLH), permissible exposure limits (PEL), reference exposure levels (REL), threshold limit values (TLV), and acute versus toxic effects.
    1. Relate toxic substances with poisons.
    2. Explain factors affecting toxicity.
    3. Explain the concept of LD50 and the relationship of LD50 tests to other tests.
    4. Explain the concept  $exposure = dose \times time$ .
    5. Explain how exposure to more than one chemical can have several outcomes.
    6. List toxic substances, such as carcinogens, mutagens, and/or teratogens, that have delayed effects.
    7. Differentiate between acute and chronic effects of exposure to toxic substances.
    8. Explain the three main routes of entry of toxic substances into the body.
    9. Explain the concepts of IDLH, PEL, REL and TLV.
    10. Explain the significance of materials safety data sheets (MSDS) and the right to examine them.
6. List both engineering controls and safe work practices used on hazardous waste sites, including confined space safety procedures.
    1. Explain engineering controls.
    2. Explain the reasons for engineering controls.
    3. List engineering controls that are used on hazardous waste sites, and explain why they are used.
    4. Predict causes of unsafe acts and conditions.
    5. Complete a confined spaces operation.
    6. Demonstrate safe drum handling.
7. List the characteristics of the major types of respiratory protective equipment and how to correctly use and work in several levels of personal protective equipment (PPE).
    1. Explain the reasons for air monitoring.
    2. Explain the principles of operation and use of the following air monitoring devices: oxygen meter, combustible gas meter, flame ionization detector (FID), ultraviolet (UV) photoionization meter (PIM), and direct reading colorimetric indicator tubes.
    3. Explain the limitations of each instrument.
    4. Explain how to safely use the equipment in a hazardous waste setting.
    5. List the various types of atmospheric devices.
    6. Explain why and where these devices are worn on hazardous waste sites.
    7. List the airborne contaminants the devices collect.
    8. Explain the distinguishing characteristics of the major types of respiratory protective equipment.
    9. Explain the selection considerations, advantages and disadvantages of the different types of respirators.
    10. Explain the importance of respirator face piece-to-face fit, and state methods of fit testing.
    11. Explain the complexities involved in chemical protective clothing (CPC) selection.
    12. Explain the importance of using properly selected CPC.

13. List available types of protective clothing and accessories.
  14. Explain the Environmental Protection Agency (EPA) levels of protection for PPE ensemble and cite various requirements for safe use of PPE.
  15. Explain the importance of the components of a sampling plan that will help ensure that the plan is fully implemented, thus ensuring worker safety.
8. List the main types of hazardous waste emergencies and list federal regulations concerning required procedures and worker responsibilities in the event of an emergency.
    1. List federal regulations concerning required procedures and workers' responsibilities in the event of an emergency.
    2. Explain the main types of emergencies, the hazards they pose, and what workers can do to combat them.
    3. Explain the government regulations applicable to the transport of hazardous wastes.
    4. Explain the meaning of labels and placards.
    5. Explain the meaning and purposes of manifests.
    6. State the goals and components of a decontamination plan.
    7. Differentiate between physical and chemical decontamination methods and appropriate uses of each.
    8. Explain procedures for decontaminating personnel, clothing, tools, and vehicles.
  9. Develop a full site safety plan for a hazardous waste site.
    1. Develop a site safety plan for a hazardous waste site.
  10. Demonstrate professional and ethical conduct as expected in industry.
    1. Identify the need for self-discipline and time management in technical industries.
    2. Communicate and function effectively as a member of a team.

**Evaluation Criteria/Policies:**

The grade will be determined using the Delaware Tech grading system:

90	-	100	=	A
80	-	89	=	B
70	-	79	=	C
0	-	69	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

**Final Course Grade:**

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Summative: Midterm Exam	20%
Summative: Final Exam	20%
Formative: Assignments (Homework, Quizzes, Readings, Participation, etc.)	60%
<b>TOTAL</b>	<b>100%</b>

**Core Curriculum Competencies (CCCs are the competencies every graduate will develop):**

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

**Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):**

**ENVAASEET**

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering activities, including but not limited to site development, hydraulics and hydrology, grading, water and wastewater treatment, pollution prevention and treatment, and sustainable design.
2. Conduct standardized field and laboratory testing.
3. Demonstrate a commitment to quality, timeliness, professional development, and continuous improvement.
4. Use graphic techniques and productivity software to produce technical documents.
5. Explain the major aspects of normal ecology of the planet and risks associated with polluting the environment.
6. Apply current federal, state, and local environmental and safety regulations and industry best management practices.

**Disabilities Support Statement:**

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.