



Course Description

ETI1701 | Industrial Safety | 3.00 credits

This course provides the student with the knowledge and skills to recognize hazardous situations in industrial plants and the precautions to be observed and practiced to perform work activities safely. Among the topics covered are industrial safety hazards, electrical safety, working with chemicals, gases, and solvents, protective equipment, and safe working conditions.

Course Competencies

Competency 1: The student will demonstrate an understanding of industrial safety practices and procedures by:

1. Identifying hazardous situations that exist in industrial plants
2. Identifying situations that require the use of protective equipment, explaining what type of equipment to use, and demonstrating the proper methods for wearing or using protective equipment, including:
 - a. hard hats
 - b. safety glasses, goggles, and face shields
 - c. ear plugs
 - d. safety shoes and boots
 - e. electrical protection equipment (rubber gloves, rubber boots)
 - f. Non-sparking tools
 - g. respirators
 - h. self-contained breathing apparatus
 - i. chemical handling clothing and equipment
 - j. high-temperature clothing and equipment
 - k. fire extinguishers
3. Describing safe work practices around hazards that may include working in or near:
 - a. high-voltage areas, energized equipment, or electrical panels
 - b. rotating equipment
 - c. an abnormal temperature environment (e.g., areas susceptible to heat stress)
 - d. the vicinity of moving heavy loads
 - e. high-noise areas
 - f. adverse environmental conditions (e.g., rain, heavy winds)
 - g. activities that generate airborne dust, debris, and particles
 - h. an abnormal pressure environment
 - i. welding, machining, and grinding activities
 - j. radiologically controlled areas (e.g., radiation or high-radiation areas, contaminated areas, radiological containments)
 - k. work being performed overhead
4. Discussing safe work practices and the consequences of not following sound practice when working with or on:
 - a. hazardous or explosive chemicals and other hazardous materials, compressed gases, high-temperature or high-pressure equipment
 - b. freeze seals
 - c. divers performing tasks in tanks and near intake and discharge structures
 - d. asbestos materials
 - e. Lead
 - f. components near or over water
5. Describing factors that may contribute to personal injury or radiological incidents and explaining how these factors affect the protection requirements

Competency 2: The student will demonstrate an understanding of industrial clearance/tagging procedures by:

1. Describing how safe work conditions are achieved and maintained by the positioning of plant components

such as breakers, valves, and other devices. This covers verification of component positions, including the use of grounding or gaging devices

1. Determining the adequacy of a tagged boundary and explaining how to verify proper clearance tagging prior to commencing work on plant equipment
2. Explaining individual responsibilities and limitations associated with working within a tagged boundary such as the operation of valves or components
3. Explaining the hazards of not adhering to clearance tags such as personnel injury and equipment damage
4. Discussing lessons learned based on plant and industry experience where improper or inadequate implementation of the clearance/tagging program impacted the performance of maintenance jobs or caused personnel injuries
5. Demonstrating the step-by-step procedure to initiate, place, and remove each type of clearance tag used at a site

Competency 3: The student will demonstrate an understanding of electrical safety by:

1. Identifying industrial plant electrical safety hazards
2. Describing electrical shock symptoms and demonstrating the proper response to an electrical shock victim
3. Describing the station policies and precautions associated with maintenance activities near or on energized electrical equipment
4. Explaining procedures for discharging stored electrical energy
5. Explaining the methods to determine when equipment is de-energized properly
6. Defining the allowable approach distance to high-voltage energized circuits
7. Explaining precautions relating to:
 - a. electrical lines embedded in earth and structures
 - b. overhead lines on site
8. Explaining the inspection requirements for commonly used electrical components (e.g., drop lights, extension cords, and hand-held power tools)
9. Identifying properly grounded tools, explaining the proper use of a ground-fault interrupter, identifying grounding hazards, and discussing ground fault isolation procedures and precautions
10. Recognizing properly installed grounding straps
11. Identifying the types of ladders acceptable for use near electrical circuits
12. Discussing lessons learned, based on industry experience, where personal injury, a fatality, or equipment damage resulted when working on electrical systems and components

Competency 4: The student will demonstrate an understanding of the safety issues concerning chemicals, gases, and solvents by:

1. Describing the purpose and general requirements of chemical control programs
2. Describing the labeling requirements for chemicals
3. Identifying hazardous chemicals found at industrial sites and explaining associated precautions
4. Describing the proper handling, storage, disposal methods, transportation, and use of chemicals, including environmental concerns
5. Explaining the reasons for and methods of avoiding personal contamination with chemicals, including inhalation, ingestion, and skin absorption
6. Explaining the reasons for avoiding chemical contamination of systems and components, including floor and equipment drains
7. Describing the proper use of special protective equipment and emergency facilities for chemicals used on the job
8. Discussing lessons learned, based on plant and industry experience, where personal injury, equipment damage, and accidental spills or releases resulted from improperly working with chemicals

Competency 5: The student will demonstrate an understanding of the safety issues concerning working from

heights and in confined spaces by:

1. Describing the proper selection and application criteria for the following:
 - a. bucket trucks
 - b. Ladders
 - c. safety belts, lines, and harnesses
 - d. scaffolds
2. Explaining the inspection and safety requirements prior to the use of each type of safety equipment
3. Describing the following procedural requirements for controlling confined space access:
 - a. obtaining special permits required to work in confined spaces
 - b. isolating, draining, purging, and flushing the space prior to entry
 - c. ventilating the space prior to personnel entry
 - d. testing the atmosphere for oxygen, explosive gas, and toxic gas concentration
 - e. clearing internal obstructions that interfere with safety lines
 - f. identifying and correcting other hazards (e.g., slippery surfaces)
 - g. installing temporary lighting
 - h. maintaining visual and oral contact between the person inside and someone outside the confined space
4. Identifying the tools and equipment that may be taken into confined spaces
5. Explaining personnel, tool, and equipment accountability

Competency 6: The student will demonstrate an understanding of safe procedures for working with transportation equipment by:

1. Explaining the policy for use and control of transportation equipment used by maintenance personnel (e.g., speed limits, use of flagman while backing)
2. Identifying site areas with restricted vehicle access (e.g., security areas, electrical switchyards, storage areas)
3. Identifying vehicles designated to transport equipment
4. Describing special safety precautions and equipment associated with each type of vehicle
5. Describing the proper methods for securing vehicle loads

Competency 7: The student will demonstrate an understanding of basic principles and practices of first aid and CPR by:

1. Discussing plant situations in which emergency first aid and/or CPR may be required
2. Citing the basic four rules of first aid
3. Listing various artificial resuscitation techniques and practicing how to apply them
4. Listing the three methods to control bleeding and practicing how to apply them
5. Describing the symptoms of shock, how to prevent shock, and how to treat shock
6. Differentiating between a simple and a compound fracture and describe emergency treatment for fractures

Learning Outcomes:

- Solve problems using critical and creative thinking and scientific reasoning
- Describe how natural systems function and recognize the impact of humans on the environment