Course Information Form (CIF)

Course Code: FST 210

Course Title: Hazardous Materials Operations

Department: Allied Health
PCS Code: 1.2 - Occupational/Technical Instruction
CIP Code: 43.0203
Repeatability: 0

Effective Date: Summer 2026

Credit Hours

Catalog Notation: 2-2-3
Credit Hour Distribution:

Lecture: 2	Lab: 2	Clinical: 0	**Total: 3**

General Course Information

Catalog Description

Systems approach to storage, transportation, and handling of hazardous materials, flammable liquids, combustible solids, oxidizing and corrosive materials, and radioactive compounds. Use of reference sources on various hazardous materials. Emphasis on control of hazardous materials incidents.

General Course Objectives

To provide students with the knowledge and skills necessary for certification by the Office of the State Fire Marshal as a hazardous materials first responder-operations level.

Minimum Placement Levels

English	Reading	Math
Placement out of ENG 098	Placement out of CCS 098	Placement into MAT 060

Prerequisites

None

Methods of Evaluation

3-6 objective exams and 3-6 objective quizzes.

Instructional Materials and Additional Supplies

Current edition of text that meets NFPA 470 standards

Course Content

General Learning Outcomes (GLOs)

- Communication: Students will demonstrate the ability to read, write, listen, and speak effectively.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
HAZ-MAT Awareness	1. Identify the definition of hazardous material. 2. Identify the organizations that receive notification of hazardous materials inventories. 3. Identify the initial notification procedures for hazardous materials incidents in the local emergency response plan or the organization's standard operating procedures. 4. Describe the functions of the State Emergency Response Commission and the Local Emergency Planning Committee. 5. Identify the five levels of responders to hazardous materials emergencies. 6. Describe the role of the Incident Command System in HAZ-MAT incidents. 7. Identify the role of the first responder at the awareness level during a hazardous materials incident, given the local emergency response plan or the organization's standard operating procedures. 8. Describe other rights and responsibilities afforded the worker in addition to SARA (Superfund Amendments and Reauthorization Act) Title III. 9. Describe the life cycle of hazardous materials. Identify terms used in reference to hazardous materials. 10. Identify the general routes of entry for human exposure to hazardous materials. 11. Compare and contrast the differences between: Exposure and contamination; Acute and chronic; Internal and external exposures. 12. Compare and contrast the ways hazardous materials are harmful (at incidents) to: People; Environment; Property. 13. Identify three methods to limit exposure. 14. Identify the health hazards associated with hazardous materials. 15. Identify typical occupancies and locations where hazardous materials are manufactured, transported, stored, used, and disposed of. 16. Identify the definitions of hazardous materials, the DOT hazard classes, common examples of materials in each hazard class, and the primary hazards associated with each by hazard class. 17. Identify typical container shapes that may indicate hazardous materials. 18. Identify markings or colors of containers that may indicate hazardous materials are present. 19. Identify U.S. placards and labels that indicate hazardous materials. 20. Identify facility and transportation markings and colors that indicate hazardous materials, including: UN/NA identification numbers; NFPA 704 markings; Military hazardous materials markings; Special hazard communications markings; Pipeline markers; Container markings. 21. Identify the basic information on Material Safety Data Sheets (MSDS) and shipping papers that indicate hazardous materials. 22. Identify where to find MSDS. 23. Identify the entries on shipping papers that indicate the presence of hazardous materials. 24. Match the name of the shipping papers found in transportation (air, highway, rail, and water) with the mode of transportation. 25. Identify the person responsible for having the shipping papers in each mode of transportation. 26. Identify where the shipping papers are found in each mode of transportation. 27. Identify where the papers may be found in an emergency in each mode of transportation.	3	5	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
HAZ-MAT Awareness (cont'd)	28. Identify examples of clues (other than occupancy, container shape, markings, placards, MSDS, and shipping papers) that use the senses of sight, sound, and odor to indicate hazardous materials. 29. Identify the limitations of using the senses in determining the presence or absence of hazardous materials. 30. Identify difficulties encountered in determining the specific names of hazardous materials in both facilities and transportation. 31. Identify sources for obtaining the names of UN/NA identification numbers for, or type of placard associated with, hazardous materials in: Transportation; Fixed Facilities. 32. Given a copy of the current edition of the North American Emergency Response Guidebook, identify the three methods for determining the appropriate guide page for a specific hazardous material. 33. Explain the two general types of hazards found on each guide page. 34. Describe the difference between the isolation distances in the orange-bordered guide pages and the protective action distances in the green-bordered pages. 35. Define each of the following protective actions: Isolate hazard area and deny entry; Evacuation; Shelter In-Place. 36. Identify the shapes of recommended initial isolation and protective action zones. 37. Identify the difference between small and large spills as found in the Table of Isolation Distances. 38. Explain the circumstances under which the following distances are used at hazardous materials incidents: Table of initial isolation and protective action distances; Isolation distances in the numbered guides. 39. Identify the recommended personal protective equipment for a named hazardous material. 40. Identify the five-step process developed to safely address an incident involving hazardous materials. 41. Identify the basic precautions to be taken to protect a firefighter and others in a hazardous materials incident given the local emergency response plan or the standard operating procedures of the authority having jurisdiction. 42. Identify the signs and symptoms of exposure to hazardous materials. 43. Identify entries on a MSDS that indicate the presence of hazardous materials.			
Orientation to HAZ-MAT Operations	1. Identify the applicability of the OSHA 29 CFR 1910.120 and EPA 40 CFR 311 Regulations to the First Responder Operations Level responder. 2. Identify the role of the First Responder Operations Level as defined in NFPA 472. 3. Identify the responsibilities of the Local Emergency Response Commission (LEPC) in hazardous materials response. 4. Identify requirements placed on facility owners/operators covered by SARA Title III. 5. Identify the roles of the Hazardous Materials First Responder Awareness Level, Hazardous Materials Technician, and Incident Commander as defined in NFPA 472. Identify the scope of NFPA Standards 471, 472, and 473. 6. Identify the four aspects of response organization. 7. Identify the five response elements interacting at a hazardous materials incident. 8. Identify the fundamental requirements placed on emergency responders by 29 CFR 1910.120. 9. Identify the role of the Illinois Department of Labor in enforcement of 29 CFR 1910.120 provisions. 10. Identify the components of a model standard operating guideline.	2	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Identification and Recognition	1. Identify the significance of and the impact on the behavior of the container and/or its contents of the following chemical and physical properties: corrosivity; flammable range; flash point; form (solid, liquid, or gas); ignition temperature; reactivity; specific gravity; toxic products of combustion; vapor density; water solubility. 2. Identify the following toxicity terms as they relate to emergency response personnel: LD50; LC50; TLV-TWA; TLV-STEL; TLV-CT; IDLH; PEL. 3. Identify the differences between the following terms: Exposure and Hazard; Exposure and Contamination; Contamination and Secondary Contamination. 4. Identify the health and physical hazards that may cause harm. Identify the health hazards associated with the following terms: Asphyxiant; Irritant; Sensitizer; Chronic health hazard. Identify the terms related to radioactive materials and describe their significance in predicting health hazards. 5. Identify the differences between acute and chronic exposures to a hazardous material. Identify four factors which affect the toxicity of a chemical agent. 6. Identify the six recognition clues as presented in class. 7. Identify how occupancy and location can assist in determining the presence of hazardous materials. 8. Given examples of various hazardous materials containers, identify the general shapes of containers for liquids, gases, and solids. 9. Given examples of non-pressure type and pressure type facility tanks, correctly identify each tank by type. 10. Given examples of pressure intermodal containers and non-pressure intermodal tanks, identify each as such. 11. Given examples of the following tank cars, identify each by type: non-pressure tank cars with or without the expansion dome; pressure tank cars; cryogenic tank cars. 12. Identify product, owner, and emergency telephone numbers on a pipeline marker. 13. Identify the U.S. DOT placards and labels utilized in transportation of hazardous materials. 14. Identify facility and transportation markings and colors that indicate hazardous materials, including: UN/NA ID Numbers; NFPA 704 Markings; Military hazardous materials markings. 15. Given the following transportation vehicles and their shipping papers, identify the vehicle or tank marking in all applicable locations: rail transport vehicles including tank cars; intermodal equipment including IM tanks; highway vehicles, including cargo tanks. 16. Given a pesticide label, identify each of the following pieces of information, then state this information with its significance in surveying the hazardous materials incident: name of product; signal word; pest control product number; precautionary statement; hazard statement; active ingredient. 17. Identify the surrounding conditions that should be noted when surveying the incident scene. 18. Discuss ways to verify information obtained from the survey of hazardous materials incidents. 19. Identify two ways in which MSDS may be obtained in an emergency. Using an MSDS for a specified material, identify the following hazardous materials and response information: physical and chemical characteristics; physical hazards of the material; health hazards of the material; signs and symptoms of exposure; routes of entry; PELs; responsible party contact; precautions for handling; applicable control measures; emergency and first aid procedures; manufacturer's emergency phone number. 20. Given examples of facility containers, identify the markings indicating container size, product contained, and/or the site identification numbers. 21. Given examples of the following cargo tanks, identify each by type: MC-306/DOT 406; MC-307/DOT-407; MC-312/DOT 412; MC-331; MC-338; Dry bulk cargo tanks.	2	3	0

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Fixed Facility Response	1. Recognize the two major types of fixed facilities. 2. Identify three types of storage found in fixed facilities. 3. Given the types of fixed site emergencies, identify the hazards associated with each: structural fire; process equipment fire; hazardous materials incident; confined space rescue. 4. Identify warning signs which may indicate a possible hazardous condition at a fixed site. 5. Identify a resource for determining the size of an endangered area of a hazardous materials incident. 6. Identify various resource manuals available for use in the field at hazardous materials incidents. 7. Identify various sources of technical assistance for use in the field at hazardous materials incidents. 8. Identify various other sources of information for use in the field at hazardous materials incidents. 9. Identify the following in relation to CHEMTREC/CANUTEC: type of assistance provided; methods of contact; information to be furnished to CHEMTREC. 10. Identify two methods of contacting the manufacturer or shipper to obtain hazard and response information.	3	0	0
Monitoring	1. Identify the resources available for determining the concentrations of a released hazardous material within an endangered area. 2. Describe the difference between sampling and monitoring. 3. Identify the regulation requiring site characterization and air monitoring. 4. Demonstrate the three stages of monitoring. 5. Identify the following terms and their importance in monitor performance: sensitivity; selectivity; response time; calibration; relative response. 6. Identify the terms associated with electrical safety of monitoring devices.	2	4	0
Personal Protective Equipment	1. Identify the three categories of personal protection. 2. Identify the difference between limited use and reusable protective clothing. Identify three measures of chemical resistance used in relation to chemically protective clothing. 3. Identify two factors used in the evaluation of the appropriateness of chemical protective clothing. 4. Identify the regulatory requirements for respiratory protective equipment. 5. Identify three types of respiratory protection and the advantages and limitations of each for use at a hazardous materials scene. 6. Identify the required physical capabilities and limitations of working in SCBA. 7. Identify skin contact hazards encountered at hazardous materials incidents. 8. Identify the purpose, advantages, and limitations of the following levels of protective clothing at hazardous materials incidents: structural fire fighting clothing; high temperature protective clothing; chemically protective splash protective clothing; chemically protective vapor protective clothing. 9. Identify the four EPA levels of protective ensembles. 10. Identify construction materials of chemically protective clothing. 11. Identify appropriate personal protective equipment given a defensive response option. 12. Identify that there are no universally inert chemically protective materials and that there are some chemicals from which responders may not be able to protect themselves. 13. Explain the importance of the buddy system and backup personnel in implementing a planned defensive response option. 14. Demonstrate safe work practices to be observed when approaching and working at hazardous materials incidents. 15. Identify the physical capabilities and limitations of personnel working in personal protective equipment. 16. Match the function of the operational components of the positive pressure SCBA with the name of the component. 17. Demonstrate the procedures for cleaning, sanitizing, and inspecting respiratory equipment. 18. Demonstrate the procedures for donning, doffing, and working in positive pressure SCBA. 19. Identify the symptoms of heat and cold stress.	2	3	0

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Health and Safety	1. Describe the factors for determining the extent of physical, health, and safety hazards which exist in the endangered area of a hazardous materials incident given the concentrations of the released material. 2. Give examples of three types of stress that could cause a container to release its contents. Identify five ways in which containers can breach. 3. Identify four ways in which containers can release contents. 4. Identify four dispersion patterns that can be created upon release. 5. Identify three general time frames for predicting the length of time that exposures may be in contact with hazardous materials in an endangered area. 6. Demonstrate the steps for determining the number of exposures that could be saved by the first responder with the resources provided and operating in a defensive response, provided the exposures already lost and an incident analysis. 7. Describe the circumstances in which it would be prudent to pull back from a hazardous materials incident. 8. Identify the methods for communicating the status of the planned response to the incident commander through the normal chain of command. 9. Identify the methods for immediate notification of the incident commander and other response personnel about the critical conditions at the incident.	3	2	0
Incident Assessment, Analysis, and Evaluation	1. Identify the purpose, procedures, equipment, and safety precautions used with each of the following: absorption; dike, dam, diversion, retention; dilution; vapor dispersion; vapor suppression. 2. Explain the differences between containment and confinement. 3. Identify the characteristics and applicability of the following foams: Protein; Fluoroprotein; Polar solvent alcohol-resistant concentrates; Hazardous materials concentrates; Aqueous film-forming foam (AFFF); High expansion. 4. Explain the problems encountered with the use of foam. 5. Explain considerations regarding the application of foam. 6. Demonstrate the location and the use of the emergency shutoff devices found on MC-306 and MC-331 cargo tanks.	3	3	0
Defensive Control Options	1. Demonstrate the procedures for establishing control of the scene through the use of control zones. 2. Describe the criteria for the determination of the location of control zones at hazardous materials incidents. 3. Identify the basic techniques at hazardous materials incidents for the following protective actions: Evacuation; In-place protection. 4. Discuss considerations for locating emergency decontamination. 5. Identify items to be considered in a safety briefing before personnel are allowed to work at a hazardous materials incident. 6. Identify the reasons for emergency decontamination at hazardous materials incidents. Explain ways that personnel, apparatus, tools, equipment, and personal protective equipment can become contaminated. 7. Identify how the need for emergency decontamination procedures is determined by the potential for secondary contamination. 8. Explain site decontamination plan characteristics. Discuss advantages and limitations of emergency decontamination. 9. Explain the recommended decontamination procedures as outlined by the US EPA.	3	3	0
Control Zones and Decontamination	1. Identify the role of the Operations Level First Responder during a hazardous materials incident according to the local emergency response plan and the standard operating procedures of the organization. 2. Discuss the law requiring the Incident Command System to be in use at a hazardous materials incident. 3. Explain hazardous materials incident levels as defined by the local emergency response plan.	2	2	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Incident Command	1. Identify the purpose and three benefits of using the Incident Command System. 2. Identify command staff and functional unit positions used in the Incident Command System. 3. Explain the considerations for the determination of the command post location for hazardous materials incidents. 4. Explain the procedures for requesting additional resources during a hazardous materials incident. 5. Explain the safety officer's responsibilities.	2	3	0
Incident Termination	1. Describe the information for incident activities that is relayed through the chain of command to the incident commander. 2. Describe the required activities for termination of a hazardous materials incident. 3. Demonstrate the process of conducting an incident critique. 4. Explain the process for revision of operating procedures and response capabilities as a result of lessons learned from the incident.	3	2	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
30	30	0