

**ARIZONA WESTERN COLLEGE
SYLLABUS**

FSC 111 HAZARDOUS MATERIALS II OPERATIONS

Credit Hours: 2 Lecture 2PREREQUISITES: FSC 110 or certified at the Hazardous Materials Level I - Awareness LevelCOURSE DESCRIPTION

First responders at the operational level are those persons who respond to releases or potential releases of hazardous materials as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release. First responders at the operational level are expected to respond in a defensive fashion to control the release from a safe distance and keep it from spreading.

1. COURSE GOALS

- 1.1 Analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes.
- 1.2 Plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
- 1.3 Implement the planned response to favorably change the outcomes consistent with the local emergency response plan and the organization's standard operating procedures.
- 1.4 Evaluate the progress of the actions taken to ensure that the response objectives are being met safely, effectively, and efficiently.

2. OUTCOMES

Upon satisfactory completion of this course, students will be able to:

- 2.1 given three (3) examples each of liquid, gas, and solid hazardous materials, identify the general shapes of containers in which the hazardous materials are typically found.
- 2.2 given examples of the following tank cars, identify each tank car by type:
 - 2.2.1 Nonpressure tank cars with and without expansion domes
 - 2.2.2 Pressure tank cars
 - 2.2.3 Cryogenic liquid tank cars
- 2.3 given examples of the following intermodal tank containers, identify each intermodal tank container by type:
 - 2.3.1 Nonpressure intermodal tank containers
 - 2.3.2 Pressure intermodal tank containers
- 2.4 given examples of the following cargo tanks, identify each cargo tank by type:
 - 2.4.1 MC-306/DOT 406 cargo tanks
 - 2.4.2 MC-307/DOT-407 cargo tanks
 - 2.4.3 MC-312/DOT-412 cargo tanks
 - 2.4.4 MC-331 cargo tanks
 - 2.4.5 MC-338 cargo tanks
 - 2.4.6 Dry bulk cargo tanks
- 2.5 given examples of the following facility tanks, identify each fixed facility tank by type:
 - 2.5.1 Nonpressure facility tanks
 - 2.5.2 Pressure facility tanks
 - 2.5.3 Cryogenic liquid tanks
- 2.6 given examples of the following nonbulk packages, identify each package by type:
 - 2.6.1 Bags
 - 2.6.2 Carboys
 - 2.6.3 Cylinders
 - 2.6.4 Drums
- 2.7 given examples of facility and transportation containers, identify the markings that differentiate one container from another.
- 2.8 given examples of the following marked transport vehicles and their corresponding shipping papers, identify the vehicle or tank identification marking:
 - 2.8.1 Rail transport vehicles, including tank cars

- 2.8.2 Intermodal equipment including tank containers
- 2.8.3 Highway transport vehicles, including cargo tanks
- 2.9 given examples of facility containers, identify the markings indicating container size, product contained, and/or site identification numbers.
- 2.10 given examples of facility and transportation situations involving hazardous materials, identify the name(s) of the hazardous material(s) in each situation.
- 2.11 identify the following information on a pipeline marker:
 - 2.11.1 Product
 - 2.11.2 Owner
 - 2.11.3 Emergency telephone number
- 2.12 given a pesticide label, identify each of the following pieces of information; then match the piece of information to its significance in surveying the hazardous materials incident:
 - 2.12.1 Name of pesticide
 - 2.12.2 Signal word
 - 2.12.3 Pest control product (PCP) number (in Canada)
 - 2.12.4 Precautionary statement
 - 2.12.5 Hazard statement
 - 2.12.6 Active ingredient
- 2.13 identify and list the surrounding conditions that should be noted by the first responders when surveying hazardous materials incidents.
- 2.14 give examples of ways to verify information obtained from the survey of a hazardous materials incident.
- 2.15 Match the definitions associated with the DOT hazard classes and divisions of hazardous materials, including refrigerated liquefied gases and cryogenic liquids, with the class or division.
- 2.16 identify two ways to obtain a material safety data sheet (MSDS) in an emergency.
- 2.17 using a material safety data sheet (MSDS) for a specified material, identify the following hazard and response information:
 - 2.17.1 Physical and chemical characteristics
 - 2.17.2 Physical hazards of the material
 - 2.17.3 Health hazards of the material
 - 2.17.4 Signs and symptoms of exposure
 - 2.17.5 Routes of entry
 - 2.17.6 Permissible exposure limits
 - 2.17.7 Responsible party contact
 - 2.17.8 Precautions for safe handling (including hygiene practices, protective measures, procedures for cleanup of spills or leaks)
 - 2.17.9 Applicable control measures including personal protective equipment
 - 2.17.10 Emergency and first aid procedures
- 2.18 identify the following:
 - 2.18.1 Type of assistance provided by CHEMTREC/CANUTEC/SETIQ
 - 2.18.2 Procedure for contacting CHEMTREC/CANUTEC/SETIQ
 - 2.18.3 Information to be furnished to CHEMTREC/CANUTEC/SETIQ
- 2.19 identify two methods of contacting the manufacturer or shipper to obtain hazard and response information.
- 2.20 given two examples of scenarios involving known hazardous materials, interpret the hazard and response information obtained from the current edition of the North American Emergency Response Guidebook, material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and shipper/manufacturer contacts.
- 2.21 match the following chemical and physical properties with their significance and impact on the behavior of the container and/or its contents:
 - 2.21.1 Boiling point
 - 2.21.2 Chemical reactivity
 - 2.21.3 Corrosivity (pH)
 - 2.21.4 Flammable (explosive) range (LEL & UEL)
 - 2.21.5 Flash point
 - 2.21.6 Ignition (autoignition) temperature
 - 2.21.7 Physical state (solid, liquid, gas)
 - 2.21.8 Specific gravity
 - 2.21.9 Toxic products of combustion

- 2.21.10 Vapor density
- 2.21.11 Vapor pressure
- 2.21.12 Water solubility
- 2.22 identify the differences among the following terms:
 - 2.22.1 Exposure and hazard
 - 2.22.2 Exposure and contamination
 - 2.22.3 Contamination and secondary contamination
- 2.23 identify three types of stress that could cause a container system to release its contents.
- 2.24 identify five ways in which containers can breach.
- 2.25 identify four ways in which containers can release their contents.
- 2.26 identify at least four dispersion patterns that can be created upon release of a hazardous material.
- 2.27 identify the three general time frames for predicting the length of time that exposures can be in contact with hazardous materials in an endangered area.
- 2.28 identify the health and physical hazards that could cause harm.
- 2.29 identify the health hazards associated with the following terms:
 - 2.29.1 Asphyxiant
 - 2.29.2 Chronic health hazard
 - 2.29.3 Convulsant
 - 2.29.4 Irritant/corrosive
 - 2.29.5 Sensitizer/allergen
- 2.30 identify a resource for determining the size of an endangered area of a hazardous materials incident.
- 2.31 given the dimensions of the endangered area and the surrounding conditions at a hazardous materials incident, estimate the number and type of exposures within that endangered area.
- 2.32 identify resources available for determining the concentrations of a released hazardous material within an endangered area.
- 2.33 given the concentrations of the released material, identify the factors for determining the extent of physical, health, and safety hazards within the endangered area of a hazardous materials incident.
- 2.34 given an analysis of a hazardous materials problem and the exposures already lost, identify the steps for determining the number of exposures that could be saved by the first responder with the resources provided by the authority having jurisdiction and operating in a defensive fashion.
- 2.35 given an analysis of a hazardous materials incident, describe the steps for determining defensive response objectives.
- 2.36 identify the defensive options to accomplish a given response objective.
- 2.37 identify the purpose for, and the procedures, equipment, and safety precautions used with, each of the following control techniques:
 - 2.37.1 Absorption
 - 2.37.2 Dike, dam, diversion, retention
 - 2.37.3 Dilution
 - 2.37.4 Remote valve shutoff
 - 2.37.5 Vapor dispersion
 - 2.37.6 Vapor suppression
- 2.38 identify the appropriate respiratory protection required for a given defensive option.
- 2.39 identify the three types of respiratory protection and the advantages and limitations presented by the use of each at hazardous materials incidents.
- 2.40 identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.
- 2.41 identify the appropriate personal protective clothing required for a given defensive option.
- 2.42 identify skin contact hazards encountered at hazardous materials incidents.
- 2.43 identify the purpose, advantages, and limitations of the following levels of protective clothing at hazardous materials incidents:
 - 2.43.1 Structural fire-fighting protective clothing
 - 2.43.2 High temperature-protective clothing
 - 2.43.3 Chemical-protective clothing
 - 2.43.3.1 Liquid splash-protective clothing
 - 2.43.3.2 Vapor-protective clothing
- 2.44 identify ways that personnel, personal protective equipment, apparatus, and tools and equipment become contaminated.

- 2.45 describe how the potential for secondary contamination determines the need for emergency decontamination procedures.
- 2.46 identify the purpose of emergency decontamination procedures at hazardous materials incidents.
- 2.47 identify the advantages and limitations of emergency decontamination procedures.
- 2.48 identify the procedures for establishing scene control through control zones.
- 2.49 identify the criteria for determining the locations of the control zones at hazardous materials incidents.
- 2.50 identify the basic techniques for the following protective actions at hazardous materials incidents:
 - 2.50.1 Evacuation
 - 2.50.2 Sheltering in-place protection
- 2.51 identify the considerations associated with locating emergency decontamination areas.
- 2.52 demonstrate the ability to perform emergency decontamination.
- 2.53 identify the items to be considered in a safety briefing prior to allowing personnel to work on a hazardous materials incident.
- 2.54 identify the role of the first responder at the operational level during hazardous materials incidents as specified in the local emergency response plan and the organization's standard operating procedures.
- 2.55 identify the levels of hazardous materials incidents as defined in the local emergency response plan.
- 2.56 identify the purpose, need, benefits, and elements of an incident management system (IMS) at hazardous materials incidents.
- 2.57 identify the considerations for determining the location of the command post for a hazardous materials incident.
- 2.58 identify the procedures for requesting additional resources at a hazardous materials incident.
- 2.59 identify the authority and responsibilities of the safety officer.
- 2.60 identify the importance of the buddy system in implementing the planned defensive options.
- 2.61 identify the importance of the backup personnel in implementing the planned defensive options.
- 2.62 identify the safety precautions to be observed when approaching and working at hazardous materials incidents.
- 2.63 identify the symptoms of heat and cold stress.
- 2.64 identify the physical capabilities required for, and the limitations of, personnel working in the personal protective equipment as provided by the authority having jurisdiction.
- 2.65 match the function of the operational components of the positive pressure self-contained breathing apparatus provided to the hazardous materials responder with the name of the component.
- 2.66 identify the procedures for cleaning, disinfecting, and inspecting respiratory protective equipment.
- 2.67 identify the procedures for donning, working in, and doffing positive pressure self-contained breathing apparatus.
- 2.68 demonstrate donning, working in, and doffing positive pressure self-contained breathing apparatus.
- 2.69 using the type of fire-fighting foam or vapor suppressing agent and foam equipment furnished by the authority having jurisdiction, demonstrate the proper application of the fire-fighting foam(s) or vapor suppressing agent(s) on a spill or fire involving hazardous materials.
- 2.70 identify the characteristics and applicability of the following foams:
 - 2.70.1 Protein
 - 2.70.2 Fluoroprotein
 - 2.70.3 Special purpose
 - 2.70.3.1 Polar solvent alcohol-resistant concentrates
 - 2.70.3.2 Hazardous materials concentrates
 - 2.70.4 Aqueous film-forming foam (AFFF)
 - 2.70.5 High expansion
- 2.71 given the appropriate tools and equipment, demonstrate how to perform the following defensive control activities:
 - 2.71.1 Absorption
 - 2.71.2 Damming
 - 2.71.3 Diking
 - 2.71.4 Dilution
 - 2.71.5 Diversion
 - 2.71.6 Retention
 - 2.71.7 Vapor dispersion
 - 2.71.8 Vapor suppression

- 2.72 identify the location and describe the use of the mechanical, hydraulic, and air emergency remote shutoff devices as found on cargo tanks.
 - 2.73 describe the objectives and dangers of search and rescue missions at hazardous materials incidents.
 - 2.74 Identify the considerations for evaluating whether defensive options are effective in accomplishing the objectives.
 - 2.75 describe the circumstances under which it would be prudent to withdraw from a hazardous materials incident.
 - 2.76 identify the methods for communicating the status of the planned response to the incident commander through the normal chain of command.
 - 2.77 identify the methods for immediate notification of the incident commander and other response personnel about critical emergency conditions at the incident.
3. METHODS OF INSTRUCTION
- 3.1 Lecture
 - 3.2 Instructional technologies Student participation
 - 3.3 Classroom exercises
 - 3.4 Field trips
 - 3.5 Practical Skill Application
 - 3.6 Examination
4. LEARNING ACTIVITIES
- 4.1 Lectures, demonstrations and visual presentations
 - 4.2 Practical application
 - 4.3 Field trips
 - 4.4 Written exercises and periodic examinations
 - 4.5 Participation in class discussions and demonstrations
 - 4.6 Drills that may include the use of equipment, vehicles, structures and other necessary apparatus
5. EVALUATION
- 5.1 Exams
 - 5.2 Assignments
 - 5.3 Participation
6. STUDENT RESPONSIBILITIES
- 6.1 Under AWC Policy, students are expected to attend every session of class in which they are enrolled.
 - 6.2 If a student is unable to attend the course or must drop the course for any reason, it will be the responsibility of the student to withdraw from the course. Students who are not attending as of the 45th day of the course may be withdrawn by the instructor. If the student does not withdraw from the course and fails to complete the requirements of the course, the student will receive a failing grade.
 - 6.3 Americans with Disabilities Act Accommodations: Arizona Western College provides academic accommodations to students with disabilities through AccessABILITY Resource Services (ARS). ARS provides reasonable and appropriate accommodations to students who have documented disabilities. It is the responsibility of the student to make the ARS Coordinator aware of the need for accommodations in the classroom prior to the beginning of the semester. Students should follow up with their instructors once the semester begins. To make an appointment call the ARS front desk at (928) 344-7674 or ARS Coordinator at (928) 344-7629, in the College Community Center (3C) building, next to Advising.
 - 6.4 Academic Integrity: Any student participating in acts of academic dishonesty—including, but not limited to, copying the work of other students, using unauthorized “crib notes”, plagiarism, stealing tests, or forging an instructor’s signature—will be subject to the procedures and consequences outlined in AWC’s Student Code of Conduct.
 - 6.5 Texts and Notebooks: Students are required to obtain the class materials for the course.
 - 6.6 Arizona Western College students are expected to attend every class session in which they are enrolled. To comply with Federal Financial Aid regulations (34 CFR 668.21), Arizona Western College (AWC) has established an Attendance Verification process for "No Show" reporting during the first 10 days of each semester.

Students who have enrolled but have never attended class may be issued a “No Show” (NS) grade by the professor or instructor and receive a final grade of “NS” on their official academic record. An NS grade may result in a student losing their federal financial aid.

For online classes, *student attendance in an online class is defined as the following* (FSA Handbook, 2012, 5-90):

- Submitting an academic assignment
- Taking an exam, an interactive tutorial or computer-assisted instruction
- Attending a study group that is assigned by the school
- Participating in an online discussion about academic matters
- Initiating contact with a faculty member to ask a question about the academic subject studied in the course