

ALABAMA FIRE COLLEGE SYLLABUS:
HAZARDOUS MATERIALS AWARENESS & OPERATIONS COURSE
COURSE INFORMATION

Days and hours of instruction: 5 days; 40 hours

CONTACT INFORMATION

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TEXTBOOK/OTHER MATERIALS

Textbook:

IFSTA *Hazardous Materials For First Responders*, 3rd edition, and *DOT Emergency Response Guidebook*, 2004 edition. Available from the [Shelton State Bookstore](#) at 1-800-538-0762

Supplementary readings:

NFPA 472, *Professional Competence of Responders to Hazardous Materials Incidents*, 2002 edition, available from NFPA at www.nfpa.org

Instructor Materials:

Teaching Outline and Powerpoint 7/2005

COURSE DESCRIPTION/OBJECTIVES

Pre-requisites: None

Description:

First responders at the awareness level are expected to recognize the presence of hazardous materials, protect themselves, secure the area, and call for trained personnel. At the operational level, the first responder uses the knowledge gained from the awareness level to act in a defensive posture to protect people, the environment, or property from the effects of an unplanned hazardous materials release. The entire course will be taught from the classroom environment through student participation. This course meets the requirements of the mandatory Awareness/Operational training in hazardous materials required by Title III – Emergency Planning and Community Right-to-Know Act of 1986 and NFPA 472, Standard on Professional Competence of Responders to Hazardous Materials Incidents.

Goals:

The purpose of this course is to specify, in terms of performance objectives, the minimum requirements for professional service as a responder to hazardous materials incidents. This course shall cover the requirements for the Hazardous Materials Awareness and Operations level of progression.

Objectives:

After completion of the Hazardous Materials Awareness level, the candidate must be able to perform the following job performance requirements:

- Analyze the incident to determine both the hazardous materials present and the basic hazard and response information for each hazardous material by completing the following tasks:
 - Detect the presence of hazardous materials
 - Survey a hazardous material incident from a safe location to identify the name, UN/NA identification number, or type placard applied for any hazardous materials involved
 - Collect hazard information from the current edition of the *North American Emergency Response Guidebook*
- Implement actions consistent with the local emergency response plan, the organization's standard operating procedures, and the current edition of the North American Emergency Response Guidebook by completing the following tasks:
 - Initiate protective actions
 - Initiate the notification process
- Identify situations where hazardous materials are present
- Identify the definition of hazardous materials
- Identify the UN/DOT hazard classes and divisions of hazardous materials and identify common examples of materials in each hazard class or division
- Identify the primary hazards associated with each of the UN/DOT hazard classes and divisions of hazardous materials by hazard class or division
- Identify the difference between hazardous materials incidents and other emergencies
- Identify typical occupancies and locations in the community where hazardous materials are manufactured, transported, stored, used or disposed of
- Identify typical container shapes that can indicate hazardous materials
- Identify facility and transportation markings and colors that indicate hazardous materials, including the following:
 - UN/NA identification numbers
 - NFPA 704 markings
 - Military hazardous materials markings
 - Special hazard communication markings
 - Pipeline markings
 - Container markings
- Given an NFPA 704 marking, describe the significance of the colors, numbers and special symbols
- Identify US and Canadian placards and labels that indicate hazardous materials
- Identify the basic information on material safety data sheets (MSDS) and shipping papers that indicates hazardous materials
- Identify where to find material safety data sheets (MSDS)
- Identify entries on a material safety data sheet that indicate the presence of hazardous materials
- Identify the entries on shipping papers that indicate the presence of hazardous materials
- Match the name of the shipping papers found in transportation (air, highway, rail and water) with the mode of transportation
- Identify the person responsible for having the shipping papers in each mode of transportation
- Identify where the shipping papers are found in each mode of transportation
- Identify where the papers can be found in an emergency in each mode of transportation
- Identify examples of clues that use the senses of sight, sound and odor to indicate hazardous materials
- Describe the limitations of using the senses in determining the presence of absence of hazardous materials

- Identify at least four types of locations that could become targets for criminal or terrorist activity using hazardous materials
- Describe the difference between a chemical and a biological incident
- Identify at least four indicators of possible criminal or terrorist activity involving chemical agents
- Identify at least four indicators of possible criminal or terrorist activity involving biological agents
- Identify the hazardous material(s) in each situation by name, UN/NA identification number, or type placard applied
- Identify difficulties encountered in determining the specific names of hazardous materials in both facilities and transportation
- Identify sources for obtaining the names of, UN/NA identification numbers for, or types of placard associated with hazardous materials in transportation
- Identify sources for obtaining the names of hazardous materials in a facility
- Identify the fire, explosion, and health hazard information for each material by using the current edition of the *Emergency Response Guidebook*
- Identify the three methods for determining the appropriate guide page for a hazardous material
- Identify the two general types of hazards found on each guide page
- Identify the actions to be taken to protect themselves and others and to control access to the scene
- Identify the location of both the local emergency response plan and the organization's standard operating procedures
- Identify the role of the first responder at the awareness level during a hazardous materials incident
- Identify the basic precautions to be taken to protect themselves and others in a hazardous materials incident
- Identify the precautions necessary when providing emergency medical care to victims of hazardous materials incidents
- Identify typical ignition sources found at the scenes of hazardous materials incidents
- Identify the ways hazardous materials are harmful to people, the environment, and property at hazardous materials incidents
- Identify the general routes of entry for human exposure to hazardous materials
- Given the identity of various hazardous materials, identify the following response information:
 - Emergency action
 - Personal Protective Equipment necessary
 - Initial isolation and protective action distances
- Given the name of a hazardous material, identify the recommended person protective equipment from the following list:
 - Street clothing and work uniform
 - Structural firefighting protective clothing
 - Positive pressure self-contained breathing apparatus
 - Chemical-protective clothing and equipment
- Identify the definitions for each of the following protective actions:
 - Isolation of the hazard area and denial of entry
 - Evacuation
 - Sheltering in-place protection
- Identify the shapes of recommended initial isolation and protective action zones
- Describe the difference between small and large spills as found in the table of initial isolation and protective action distances

- Identify the circumstances under which the following distances are used as a hazardous materials incident
 - Table of initial isolation and protective action distances
 - Isolation distances in the numbered guides
- Describe the difference between the isolation distances in the orange-bordered guide pages and the protective action distances in the green-bordered pages in the document
- Identify the techniques used to isolate the hazard area and deny entry to unauthorized persons at hazardous materials incidents
- Identify at least four specific actions necessary when an incident is suspected to involve criminal or terrorist activity
- Given either a facility or transportation scenario involving hazardous materials, regardless of the presence of criminal or terrorist activities, identify the appropriate initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures

After completion of the Hazardous Materials Operational level, the candidate must be able to perform the following job performance requirements:

- Analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes
- Survey the hazardous materials incident to identify the containers and materials involved, determine whether hazardous materials have been released, and evaluate the surrounding conditions
- Collect hazard and response information from MSDS; CHEMTREC/CANUTEC/SETIQ; local, state, and federal authorities; and shipper/manufacturer contacts
- Predict the likely behavior of a material as well as its container
- Estimate the potential harm at a hazardous materials incident
- Plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment
- Describe the response objectives for hazardous materials incidents
- Describe the defensive options available for a given response objective
- Determine whether the personal protective equipment provided is appropriate for implementing each defensive option
- Identify the emergency decontamination procedures
- Implement the planned response to favorably change the outcomes consistent with the local emergency response plan and the organization's standard operating procedures
- Establish and enforce scene control procedures including control zones, emergency decontamination, and communications
- Initiate an incident management system (IMS) for hazardous materials incidents
- Don, work in, and doff personal protective equipment provided by the authority having jurisdiction
- Perform defensive control functions identified in the plan of action
- Evaluate the progress of the actions taken to ensure that the response objectives are being met safely, effectively, and efficiently
- Evaluate the status of the defensive actions taken in accomplishing the response objectives
- Communicate the status of the planned response
- Survey the incident to identify the containers and materials involved, determine whether hazardous materials have been released, and evaluate the surrounding conditions
- Given three examples each of liquid, gas, and solid hazardous materials, including various hazard classes, the first responder at the operational level shall identify the general shapes of containers in which the hazardous materials are typically found

- Given examples of the following tank cars, the first responder at the operational level shall identify each tank car by type as follows:
 - Cryogenic liquid tank cars
 - High-pressure tube cars
 - Nonpressure tank cars
 - Pneumatically unloaded hopper cars
 - Pressure tank cars
- Given examples of the following intermodal tanks, the first responder at the operational level shall identify each intermodal tank by type and identify at least one material and its hazard class that is typically found in each tank as follows:
 - Nonpressure intermodal tanks
 - Pressure intermodal tanks
 - Specialized intermodal tanks
- Given examples of the following cargo tanks, the first responder at the operational level shall identify each cargo tank by type as follows:
 - Nonpressure liquid tanks
 - Low pressure chemical tanks
 - Corrosive liquid tanks
 - High pressure tanks
 - Cryogenic liquid tanks
 - Dry bulk cargo tanks
 - Compressed gas tube trailers
- Given examples of the following tanks, the first responder at the operational level shall identify at least one material, and its hazard, that is typically found in each tank as follows:
 - Nonpressure tank
 - Pressure tank
 - Cryogenic liquid tank
- Given examples of the following nonbulk packages, the first responder at the operational level shall identify each package by type as follows:
 - Bags
 - Carboys
 - Cylinders
 - Drums
- Given examples of the following radioactive material containers, the first responder at the operational level shall identify each container/package by type as follows:
 - Type A
 - Type B
 - Industrial
 - Excepted
 - Strong, tight containers
- Given examples of facility and transportation containers, the first responder at the operational level shall identify the markings that differentiate one container from another
- Given examples of the following marked transport vehicles and their corresponding shipping papers, the first responder at the operational level shall identify the vehicle or tank identification marking as follows:
 - Rail transport vehicles, including tank cars
 - Intermodal equipment including tank containers
 - Highway transport vehicles, including cargo tanks
- Given examples of facility containers, the first responder at the operational level shall identify the markings indicating container size, product contained, and/or site identification numbers
- Given examples of facility and transportation situations involving hazardous materials, the first responder at the operational level shall identify the name(s) of the hazardous material(s) in each situation

- The first responder at the operational level shall identify the following information on a pipeline marker:
 - Product
 - Owner
 - Emergency telephone number
- Given a pesticide label, the first responder at the operational level shall identify each of the following pieces of information, then match the piece of information to its significance in surveying the hazardous materials incident:
 - Name of pesticide
 - Signal word
 - Pest control product (PCP) number (in Canada)
 - Precautionary statement
 - Hazard statement
 - Active ingredient
- Given a label for a radioactive material, the first responder at the operational level shall identify vertical bars, contents, activity, and transport index
- The first responder at the operational level shall identify and list the surrounding conditions that should be noted by the first responders when surveying hazardous materials incidents
- The first responder at the operational level shall give examples of ways to verify information obtained from the survey of a hazardous materials incident
- The first responder at the operational level shall identify at least three additional hazards that could be associated with an incident involving criminal or terrorist activity
- Collect hazard and response information using MSDS; CHEMTREC/CANUTEC/SETIQ; local, state, and federal authorities; and contacts with the shipper/manufacturer
- Match the definitions associated with the UN/DOT hazard classes and divisions of hazardous materials, including refrigerated liquefied gases and cryogenic liquids, with the class or division
- Identify two ways to obtain an MSDS in an emergency
- Using an MSDS for a specified material, identify hazard and response information
- Identify types of assistance provided by CHEMTREC/CANUTEC/SETIQ and local, state, and federal authorities
- Identify procedures for contacting CHEMTREC/CANUTEC/SETIQ and local, state, and federal authorities
- Identify information to be furnished to CHEMTREC/CANUTEC/SETIQ and local, state, and federal authorities
- Identify two methods of contacting the manufacturer or shipper to obtain hazard and response information
- Identify the type of assistance provided by local, state, and federal authorities with respect to criminal or terrorist activities involving hazardous materials
- Identify the procedure for contacting local, state, and federal authorities as specified in the local emergency response plan (ERP) or the organization's standard operating procedures
- Describe the properties and characteristics of alpha particles, beta particles, gamma rays, and neutrons
- Given an incident involving a single hazardous material, the first responder at the operational level shall predict the likely behavior of the material and its container
- Given two examples of scenarios involving known hazardous materials, interpret the hazard and response information obtained from the current edition of the *Emergency Response Guidebook*; MSDS; CHEMTREC/CANUTEC/SETIQ; local, state, and federal authorities; and shipper/manufacturer contacts
- Match chemical and physical properties with their significance and impact on the behavior of the container and/or its contents
- Identify the differences between the following pairs of terms:
 - Exposure and hazard
 - Exposure and contamination
 - Contamination and secondary contamination
 - Radioactive material exposure (internal and external) and radioactive contamination

- Identify three types of stress that could cause a container system to release its contents
- Identify five ways in which containers can breach
- Identify four ways in which containers can release their contents
- Identify at least four dispersion patterns that can be created upon release of a hazardous material
- 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
- Identify the health and physical hazards that could cause harm
- Identify the health hazards associated with the following terms:
 - Asphyxiant
 - (b)* Chronic health hazard
 - Convulsant
 - Irritant/corrosive
 - Sensitizer/allergen
 - Alpha, beta, gamma, and neutron radiation
- Given the following types of warfare agents, identify the corresponding UN/DOT hazard class and division:
 - Nerve agents
 - Vesicants (blister agents)
 - Blood agents
 - Choking agents
 - Irritants (riot control agents)
 - Biological agents and toxins
- The first responder at the operational level shall estimate the potential harm within the endangered area at a hazardous materials incident
- Identify a resource for determining the size of an endangered area of a hazardous materials incident
- 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
- Identify resources available for determining the concentrations of a released hazardous material within an endangered area
- 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
- Describe the impact that time, distance, and shielding have on exposure to radioactive materials specific to the expected dose rate
- Describe the prioritization of emergency medical care and removal of victims from the hazard area relative to exposure and contamination concerns
- Given at least two scenarios involving hazardous materials incidents (one facility and one transportation), the first responder at the operational level shall describe the first responder's response objectives for each problem and also shall meet the following requirements:
 - 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
 - Given an analysis of a hazardous materials incident, describe the steps for determining defensive response objectives
 - Describe how to assess the risk to a responder for each hazard class in rescuing injured persons at a hazardous materials incident
 - Given simulated facility and transportation hazardous materials problems, the first responder at the operational level shall identify the defensive options for each response objective
 - Identify the defensive options to accomplish a given response objective

- Identify the purpose for, and the procedures, equipment, and safety precautions used with, each of the following control techniques:
 - Absorption
 - Dike, dam, diversion, retention
 - Dilution
 - Remote valve shutoff
 - Vapor dispersion
 - Vapor suppression
- Given the name of the hazardous material involved and the anticipated type of exposure, the first responder at the operational level shall determine whether available personal protective equipment is appropriate for implementing a defensive option and also shall meet the following requirements:
 - Identify the respiratory protection required for a given defensive option
 - Identify the three types of respiratory protection and the advantages and limitations presented by the use of each at hazardous materials incidents
 - Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus
 - Identify the personal protective clothing required for a given defensive option and the following:
 - Identify skin contact hazards encountered at hazardous materials incidents
 - Identify the purpose, advantages, and limitations of the following levels of protective clothing at hazardous materials incidents:
 - Structural fire-fighting protective clothing
 - High temperature-protective clothing
 - Chemical-protective clothing
 - Liquid splash-protective clothing
 - Vapor-protective clothing
 - The first responder at the operational level shall identify emergency decontamination procedures
 - Identify ways that personnel, personal protective equipment, apparatus, tools, and equipment become contaminated
 - Describe how the potential for secondary contamination determines the need for emergency decontamination procedures
 - Identify the purpose of emergency decontamination procedures at hazardous materials incidents
 - Identify the advantages and limitations of emergency decontamination procedures
 - Describe the procedure listed in the local emergency response plan or the organization's standard operating procedures for decontamination of a large number of people exposed to hazardous materials
 - Describe procedures, such as those listed in the local emergency response plan or the organization's standard operating procedures, to preserve evidence at hazardous materials incidents involving suspected criminal or terrorist acts
 - Given scenarios for facility and/or transportation hazardous materials incidents, the first responder at the operational level shall identify how to establish and enforce scene control including control zones, emergency decontamination, and communications
 - Identify the procedures for establishing scene control through control zones
 - Identify the criteria for determining the locations of the control zones at hazardous materials incidents
 - Identify the basic techniques for the following protective actions at hazardous materials incidents:
 - Evacuation
 - Sheltering in-place protection
 - Identify the considerations associated with locating emergency decontamination areas
 - Demonstrate the ability to perform emergency decontamination

- Identify the items to be considered in a safety briefing prior to allowing personnel to work at the following:
 - Hazardous materials incident
 - Hazardous materials incident involving criminal or terrorist activities
- Given simulated facility and/or transportation hazardous materials incidents, the first responder at the operational level shall initiate the incident management system specified in the local emergency response plan and the organization's standard operating procedures
- 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
- Identify the levels of hazardous materials incidents as defined in the local emergency response plan
- Identify the purpose, need, benefits, and elements of an incident management system at hazardous materials incidents
- Identify the considerations for determining the location of the command post for a hazardous materials incident
- Identify the procedures for requesting additional resources at a hazardous materials incident
- Identify the authority and responsibilities of the safety officer
- The first responder at the operational level shall demonstrate the ability to don, work in, and doff the personal protective equipment provided by the authority having jurisdiction
- Identify the importance of the buddy system in implementing the planned defensive options
- Identify the importance of the backup personnel in implementing the planned defensive options
- Identify the safety precautions to be observed when approaching and working at hazardous materials incidents
- Identify the symptoms of heat and cold stress
- Identify the physical capabilities required for, and the limitations of, personnel working in the personal protective equipment as provided by the authority having jurisdiction
- 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
- Identify the procedures for cleaning, disinfecting, and inspecting respiratory protective equipment
- Identify the procedures for donning, working in, and doffing positive pressure self-contained breathing apparatus
- Demonstrate donning, working in, and doffing positive pressure self-contained breathing apparatus
- Given a plan of action for a hazardous materials incident within their capabilities, the first responder at the operational level shall demonstrate defensive control actions set out in the plan
- Using the type of fire-fighting foam or vapor suppressing agent and foam equipment furnished by the authority having jurisdiction, demonstrate the effective application of the fire-fighting foam(s) or vapor suppressing agent(s) on a spill or fire involving hazardous materials
- Identify the characteristics and applicability of the following foams:
 - Protein
 - Fluoroprotein
 - Special purpose
 - Polar solvent alcohol-resistant concentrates
 - Hazardous materials concentrates
 - Aqueous film-forming foam (AFFF)
 - High expansion

- Given the required tools and equipment, demonstrate how to perform the following defensive control activities:
 - Absorption
 - Damming
 - Diking
 - Dilution
 - Diversion
 - Retention
 - Vapor dispersion
 - Vapor suppression
- Identify the location and describe the use of the mechanical, hydraulic, and air emergency remote shutoff devices as found on cargo tanks
- Describe the objectives and dangers of search and rescue missions at hazardous materials incidents
- Describe methods for controlling the spread of contamination to limit impacts of radioactive materials
- Given simulated facility and/or transportation hazardous materials incidents, the first responder at the operational level shall evaluate the status of the defensive actions taken in accomplishing the response objectives
- Identify the considerations for evaluating whether defensive options are effective in accomplishing the objectives
- Describe the circumstances under which it would be prudent to withdraw from a hazardous materials incident
- The first responder at the operational level shall communicate the status of the planned response to the incident commander and other response personnel
- Identify the methods for communicating the status of the planned response to the incident commander through the normal chain of command
- Identify the methods for immediate notification of the incident commander and other response personnel about critical emergency conditions at the incident

Please note: Test questions are taken from the instructor's lecture AND the assigned reading. While some questions from the assigned reading may not be covered during class due to time constraints, students are responsible for knowing and understanding ALL information assigned in the syllabus.

Instructional methods: Classroom Instruction and Hands-on practical evolutions

COURSE SCHEDULE

(Tentative, subject to change depending on the progress of the class)

Monday

Hazardous Materials Regulations, Definitions, and Statistics
Hazardous Materials Properties and Hazards

Tuesday

Hazardous Materials Identification
Incident Management Elements

Wednesday

Strategic Goals and Tactical Objectives
Personal Protective Equipment

Thursday

Contamination and Decontamination
Incident-Specific Strategies and Tactics

Friday

Terrorist and Other Criminal Activities
Practical Evolutions

COURSE POLICIES

Attendance:

Students are expected to attend all classes. Failure to appear in class for a scheduled activity will be considered an absence, unless prior permission is received from the instructor. For any absence to be excused, it must be accompanied by written description of extenuating circumstances. For a certification course, students must attend all classes to obtain certification.

Tardiness:

Students must adhere to class schedules. Students are required to be punctual for all classes and class activities. Classes will begin promptly at the scheduled time unless specific instructions are given otherwise.

Class participation:

This course will involve discussion, questions and answers on the materials, and case study. Class participation is expected from all students.

Safety:

Safety of the students is top priority to the Alabama Fire College. Students must adhere to safety regulations while attending a class on or off the Fire College campus. At the Fire College campus, safety instructions are posted in every classroom, as well as escape routes and tornado actions.

Academic misconduct:

Academic misconduct or dishonesty such as cheating and plagiarism is not permitted in class. Suspected cases of academic misconduct will be reported to the Executive Director. Conduct detrimental to the fire service on or off campus will not be tolerated. We will investigate any complaints, and if the complaint is valid the student will be dismissed and his/her agency will be notified.

STUDENT FEEDBACK

Evaluation form:

An evaluation form will be provided for each student at the end of the course. Please use this evaluation form as a means of communicating your opinions on the course, course content, instructor and facilities.