FIRE 77 Course Outline as of Fall 2018

CATALOG INFORMATION

Dept and Nbr: FIRE 77 Title: HAZMAT FOR PUBLIC SAFETY
Full Title: Hazardous Materials for Public Safety
Last Reviewed: 9/9/2024

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 157.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	FIRE399.61

Catalog Description:
A comprehensive study of the emergency response to hazardous materials (hazmat) incidents. Includes basic hazardous materials legal requirements; hazard recognition and safety; terrorism recognition and response; use of the Emergency Response Guidebook (ERG); hazardous materials properties and effects; hazardous material classification; chemical monitoring equipment; reference materials and databases; isolation and notification requirements; incident planning, organization, command and scene management; response training levels, tactics and strategies; Personal Protective Equipment (PPE); countermeasures; protective actions; decontamination, documentation, and disposal requirements. Students who are successful in the requirements of the course and state testing will receive certificates in Hazardous Materials First Responder Operations (FRO), Decontamination, Weapons of Mass Destruction (WMD), and Incident Command from the California Specialized Training Institute (CSTI). This course certified by the Commission on Peace Officer Standards and Training (P.O.S.T.) for the State of California

Prerequisites/Corequisites:

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: A comprehensive study of the emergency response to hazardous materials (hazmat) incidents. Includes basic hazardous materials legal requirements; hazard recognition and safety; terrorism recognition and response; use of the Emergency Response Guidebook (ERG); hazardous materials properties and effects; hazardous material classification; chemical monitoring equipment; reference materials and databases; isolation and notification requirements; incident planning, organization, command and scene management; response training levels, tactics and strategies; Personal Protective Equipment (PPE); countermeasures; protective actions; decontamination, documentation, and disposal requirements. Students who are successful in the requirements of the course and state testing will receive certificates in Hazardous Materials First Responder Operations (FRO), Decontamination, Weapons of Mass Destruction (WMD), and Incident Command from the California Specialized Training Institute (CSTI). This course certified by the Commission on Peace Officer Standards and Training (P.O.S.T.) for the State of California (Grade Only)
Prerequisites/Corequisites:
Recommended: Eligibility for ENGL 100 or ESL 100
Limits on Enrollment:
Transfer Credit: CSU;
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**			Effective:	Inactive:
CSU GE:	**Transfer Area**			Effective:	Inactive:
IGETC:	**Transfer Area**			Effective:	Inactive:
CSU Transfer:	Transferable	Effective:	Fall 1998	Inactive:	
UC Transfer:		Effective:		Inactive:	

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Demonstrate the use of the ERG to identify the hazardous materials, hazard classification, recommended protective distances, primary and secondary hazards and/or chemical behaviors, appropriate PPE and first responder actions.
2. Recognize the need for and demonstrate emergency, and technical decontamination of victims and responders.
3. Demonstrate the implementation of the Incident Command System for safe and competent response to a hazardous materials incident.

Objectives:

At the conclusion of this course, the student should be able to:

1. Identify the various levels of training for dealing with a hazmat incidents and response strategies.
2. Describe transportation methods for hazmats, containers, the placarding system, use of the ERG, response information and isolation guides.
3. Describe the use of hazardous materials in terrorism and the potential targets.
4. Identify the physical & chemical properties of hazmats, hazard classes and their exposure hazards.
5. Identify federal & state laws and regulations related to hazmats.
6. Describe methods of scene safety, management and the application of the Incident Command System (ICS) at hazmat incidents.
7. Identify the mandatory notification requirements and the need to communicate with other government agencies.
8. Identify the appropriate levels of PPE their use and limitations in conducting work activities.
9. Identify the appropriate selection and use of countermeasures.
10. Identify the appropriate selection and principles of protective actions.
11. Identify the documentation and disposal requirements associated with a hazmat incident.
12. Describe and demonstrate the principles of decontamination.
13. Use of the Identification and Hazard Assessment (IDHA) to develop and implement an Incident Action Plan (IAP) for a competent response to a hazmat incident.

Topics and Scope:

I. Introduction to Hazmat at the FRO Level
   A. Training levels
      1. First Responder Awareness (FRA)
      2. First Responder Operations (FRO)
      3. Hazmat Technician
      4. Hazmat Specialist
      5. Hazmat Incident Commander (IC)
   B. Response Strategies
      1. Non-intervention
      2. Defensive
      3. Offensive

II. Hazmat Transportation, Containers, Placards, Information Sources and Use of the ERG
   A. Transportation of hazmats
      1. Trucks
      2. Trains
      3. Intermodals
      4. Shipping
      5. Aircraft
   B. Containers
      1. Non-bulk
      2. Bulk
      3. Facility containment systems
      4. Pipelines
      5. Containers at clandestine facilities
   C. Placards and information sources
      1. DOT (UN) placards
      2. National Fire Protection Administration (NFPA) standard 704 markings
      3. Military markings

4. Material Safety Data Sheets (MSDS)
5. Chemical Transportation Emergency Center (CHEMTREC)
6. Poison Control
7. Wiser
8. CAMEO
9. Other computer databases
10. Monitoring equipment
11. Facilities and occupancy type
12. Physical observations
    a. Sights
    b. Sounds
    c. Odors
13. Shipping papers

D. ERG
1. Use
2. Hazard classifications
3. Toxic inhalation hazard (TIH)
4. Response information
5. Isolation guides
    a. Protective action
    b. WMD's
6. Glossary
7. Tables I, II & III
8. Globally harmonized system (GHS) of classification and their labels

III. Terrorism and Hazmats

A. Motivations
B. Groups and individuals
C. Terrorism response priorities
D. Types of attacks
1. Chemical
2. Nuclear/radiation
3. Biological
4. Explosive

E. Targets
1. Infrastructure
2. Symbolic
3. Civilian
4. Eco-terrorism
5. Agro-terrorism
6. Cyber-terrorism

F. Terrorism case studies
1. Indicators of criminal or terrorist activity
2. Responder safety
    a. Toxicity
    b. Secondary devices

IV. Hazmat Properties, Hazard Classes and Exposure Hazards

A. States of matter
B. Physical and chemical changes
1. Physical change
2. Thermal influence
3. Mechanical damage
4. Chemical reaction

5. Boiling liquid expanding vapor explosion (BLEVE)
6. Expansion ratios

C. Hazmat classes
1. Explosives
2. Gases
3. Flammable and combustible liquids
a. Flashpoint
b. Ignition temperature
c. Flammable range
d. Vapor pressure
e. Boiling point
f. Vapor density
g. Specific gravity
h. Solubility
4. Flammable solids
5. Spontaneous combustible
6. Dangerous when wet
7. Oxidizers, Organic peroxides
8. Poisons
9. Radiation
10. Corrosives

D. Exposure hazards
1. Exposure vs. contamination
2. Secondary contamination
3. Routes of entry
4. Chronic vs acute exposure
5. Target organs
6. Sensitizers
7. Toxicity
a. Lethal dose (LD) 50
b. Lethal concentration (LC) 50
8. Use of monitoring equipment

V. State and Federal Hazardous Materials Regulations

A. California Code of Regulations
1. Title 8
2. Title 19
3. Title 22
4. Title 23
5. Title 24
6. Fish & Game Code

B. Federal Laws - CFR 49

VI. Scene Safety, Management and Initiating Incident Command

A. Arriving safely
1. Upwind, uphill and upstream
2. Size-up: Chemical ID and hazards
3. FRO PPE limitations
4. Rescue considerations using the ERG

B. Scene management
1. Public isolation distances
a. Small spill or fire
b. Large spill or fire
2. Establishing a perimeter

3. Controlling access points
4. Monitoring weather conditions
5. Identifying storm drains and other conduits

C. Initiating the ICS
1. Command modes
a. Unified command
b. Single command
2. Incident Command (IC) responsibilities
a. Command staff
b. General staff
3. Hazmat group
a. Position functions
b. Training levels
4. Resource typing
a. Type I teams
b. Type II teams
c. Type III teams
5. Outside agency involvement
a. Local
b. State
c. Federal
d. Private

VII. Notification Requirements and Communication with other Government Agencies
A. Notification requirements
1. Dispatch
2. Certified Unified Program Agency (CUPA)
3. State Warning Center
4. National response Center

B. Communicating with governmental agencies

VIII. PPE Levels, Use and Limitations
A. Levels
1. Level A
2. Level B
3. Level C
4. Turnouts
5. Flash protection

B. PPE Use
1. Donning and doffing
2. Work activities

C. Limitations
1. Hazards of PPE
2. Common PPE failures

IX. Countermeasures
A. Damming
B. Diking
C. Berming
D. Covering
E. Foam application
F. Absorbent applications
G. Fogging

X. Protective Action Principles
A. Evacuation

- B. Shelter in place
- C. Rescue operations

XI. Documentation and Disposal Requirements
- A. Evidence preservation and sampling
- B .Incident Action Plans (IAPs)
- C. Rescue and recovery
- D. Incident termination
  1. Debriefing
  2. Critique
  3. Written reports

XII. Decontamination (Decon) Methods and Practices
- A. Methods
  1. Absorption
  2. Adsorption
  3. Chemical degradation
  4. Dilution
  5. Disinfection
  6. Evaporation
  7. Isolation and disposal
  8. Neutralization
  9. Solidification
  10. Sterilization
  11. Vacuuming
  12. Washing
- B. Practices
  1. Technical decontamination
  2. Emergency decontamination
  3. Mass decontamination
  4. Secondary decontamination
  5. Respiratory decontamination

XIII. Identification Hazard Assessment (IDHA) and Developing an IAP
- A. Requirements and functions of the IC
  1. Serving as the On-Scene Coordinator
  2. Applicable laws and regulations
  3. Site safety plans
- B. Conducting the IDHA
  1. Identifying the substance - Resource materials
     a. Written
     b. Computer databases
  2. Monitoring equipment
  3. Assessing the hazard
     a. General health and fire hazard
     b. Physical and chemical properties
     c. Variables and modifying conditions
     d. Modeling behavior and outcomes
        i. Volume
        ii. Concentration
        iii. Exposure
        iv. Duration
        v. Weather
        vi. Plume modeling
        vii. Populations threatened

viii. Toxicology
ix. Logistical problems
e. Outcome if no actions are taken

C. Developing the IAP
1. Identifying objectives
2. Identifying options
3. Understanding countermeasures
4. PPE
5. Identifying protective actions
6. Pre-incident planning
a. Local response plans
b. Area response plans
7. Agency specific responsibilities
8. Safety briefings
9. Safety practices
a. Buddy system
b. Back-up team
10. Decon options
11. Confined space considerations
a. Atmospheric hazards
i. Oxygen deficient
ii. Oxygen enriched
iii. Explosive atmospheres
iv. Toxic atmospheres
b. Physical hazards
i. Engulfment
ii. Slips and falls
iii. Electrical
iv. Structural
v. Mechanical

D. Implementing the response
1. Command options
a. Single
b. Unified
2. Roles and responsibilities
3. Emergency plan
4. Outside agency support
a. Coast Guard
b. EPA
c. FBI
5. Public Information Officer (PIO)
6. Liaison Officer
7. Joint information center

E. Evaluating progress

F. Terminating the incident
1. Debriefing
2. Conducting a critique
3. Reporting and documenting

Assignment:

1. Read 30 - 50 pages weekly from the textbook and other assigned material

2. Complete a written report on a hazardous materials or terrorism incident
3. Research paper on a contemporary hazardous materials topic
4. Quizzes (5 - 10)
5. Midterm exam
6. CSTI FRO exam
7. CSTI Decontamination exam
8. CSTI WMD exam
9. CSTI Incident Commander exam
10. Perform 3 - 8 field, written or class room scenarios
11. Perform 2 - 4 hazardous materials identification exercises
12. ERG skills exercises (2 - 4)
13. Decontamination skills exercises (2 - 4)
14. Donning and doffing PPE skills exercises (2 - 4)
15. Countermeasure skill exercise(s) (1 - 4)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Written homework/Term paper	Writing 5 - 25%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems	Problem solving 20 - 40%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Class performances	Skill Demonstrations 15 - 25%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes (multiple choice) and Exams	Exams 35 - 40%

Other: Includes any assessment tools that do not logically fit into the above categories.

None	Other Category 0 - 0%

Representative Textbooks and Materials:
Hazardous Materials Incident Commander. California Safety Training Institute. (recent edition)
DOT - Emergency Response Guide. Dept. of Transportation. 2016