



El Camino College
COURSE OUTLINE OF RECORD – Official

Course Acronym:	FTEC
Course Number:	10
Descriptive Title:	Hazardous Materials
Division:	Health Sciences and Athletics
Department:	Fire and Emergency Technology
Course Disciplines:	Environmental Technology, Fire and Emergency Technology
Catalog Description:	This course is a study of firefighting practices related to hazardous chemicals and their physical properties, uses in industry and characteristics when involved in spills and fires. It includes basic information regarding health effects and treatment, as well as fire department protocols and responsibilities.
Prerequisite:	
Co-requisite:	
Recommended Preparation:	Fire and Emergency Technology 1 Eligibility for English 1A
Enrollment Limitation:	
Hours Lecture (per week):	3
Hours Laboratory (per week):	0
Outside Study Hours:	6
Total Course Hours:	54
Course Units:	3
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	Prior to July 1992
Transfer UC:	No
Effective Date:	
General Education:	ECC
Term:	
Other:	
CSU GE:	
Term:	
Other:	

IGETC:	
Term:	
Other:	
Student Learning Outcomes:	<p>SLO #1 First Responder</p> <p>After the course of instruction the student will be able to describe the role of the First Responder.</p> <p>SLO #2 Five Flammable Liquids</p> <p>The student will be able to identify five flammable liquids.</p> <p>SLO #3 Spill Containment</p> <p>The student will be able to identify three basic methods of spill containment.</p>
Course Objectives:	<ol style="list-style-type: none"> 1. Describe "Hazard Classes" used by the Department of Transportation. 2. Describe the United Nations Placarding and Labeling System. 3. Compare and contrast the basic physical properties and burning characteristics of the various classes of hazardous materials. 4. Describe the need for incident control, including scene isolation and stabilization. 5. Analyze and choose acceptable methods of incident control measures for a variety of potential hazardous materials. 6. Describe the importance of evacuation, non-commitment of fire fighting forces and total withdrawal procedures under certain hazardous materials conditions. 7. Analyze and describe the effects of modifying conditions such as wind, temperature and other weather and terrain-related factors which may affect control of a hazardous material incident. 8. Describe the human health hazards and symptoms of exposure to chemical classes. 9. List and compare safety considerations encountered by the fire department to ensure compliance with state and federal guidelines. 10. Describe the legislative and legal authority controlling the actions of all agencies involved in incident control. 11. Analyze case studies involving emergency hazardous material incidents. Develop management protocols for hazardous material incidents.
Major Topics:	<p>I. OVERVIEW OF HAZARDOUS MATERIALS (1 hour, lecture)</p> <p>A. First Responder Operations (FRO)</p> <p>B. Emergency Response Guidebook (ERG)</p> <p>II. REVIEW BASIC CHEMISTRY (10 hours, lecture)</p> <p>A. Composition of matter</p> <ol style="list-style-type: none"> 1. The atom 2. The elements 3. Sub-atomic particles

B. Periodic Table of Elements

1. Groups and their names
2. Shells
3. Electron configuration

C. Chemical names and symbols

1. Process symbols
2. Inorganic naming rules
3. Organic naming rules

D. Review of bonds

1. Covalent bond
2. Ionic bond
3. Metallic bond

E. Review of chemical formula writing and its importance

1. Electron configuration style
2. Molecular formula style
3. Structural formula style

F. Review of typical response capability of first responder

1. Tools
2. Protective clothing
3. Training
4. Experience
5. Knowledge
6. Limitations

III. FLAMMABLE AND COMBUSTIBLE LIQUIDS (10 hours, lecture)

A. Department of Transportation (DOT) hazard classifications, placarding requirements and definitions

B. Flammable characteristics, dangers, physical properties

C. Burning characteristics

D. Typical containers

E. Fire ground strategy, tactics and procedures

IV. FLAMMABLE/NON-FLAMMABLE COMPRESSED GASES (5 hours, lecture)

A. DOT hazard classifications, placarding requirements and definitions

B. Flammable characteristics, physical properties

C. Burning characteristics

D. Dangers regarding compressed gas containers involved in fire

1. Boiling Liquid Expanding Vapor Explosion (BLEVE) Theory

2. BLEVE and rupture prevention countermeasures

3. Abandon operations and withdrawal determination

E. Fireground tactics and procedures

V. FLAMMABLE SOLIDS AND COMBUSTIBLE METALS (5 hours, lecture)

A. DOT hazard classifications, placarding requirements

1. Definitions

2. Typical containers and packaging

B. Burning characteristics, other unique dangers

1. Spontaneously ignitable substances

2. Water reactive substances

3. Toxic flammable solids

C. Problem of heat production and difficulty of extinguishment

D. Fire ground tactics and procedures

1. Special cases: water not allowed

2. Specialized extinguishing agents

VI. OXIDIZING AGENTS (5 hours, lecture)

A. DOT hazard classifications, placarding requirements and definitions

B. Burning characteristics

1. Rule of "-ates"
2. Rules of "-ites"

C. Problem of heat production and difficulty of extinguishment

D. Fireground tactics and procedures

1. Special cases: volume of water inadequate
2. Special cases: extinguishment not advised

VII. INTRODUCTION TO TOXICOLOGICAL TERMINOLOGY (1 hour, lecture)

A. Threshold Limit Value (TLV)

B. Parts Per Million (PPM)

C. Lethal Dose 50% (LD/50)

D. Immediately Dangerous to Life/Health (IDLH)

VIII. POISON CASES (2 hours, lecture)

A. DOT hazard classifications, placarding requirements

1. Definitions
2. Typical

B. Burning characteristics

C. Other chemical properties

1. Toxicity
2. Reactivity
3. Corrosiveness

D. Typical health hazards, dangers

1. Symptoms of poisoning
2. First aid

E. Containment systems

1. Size
2. Shape

3. Design

F. Fireground tactics and procedures

IX. POISON LIQUIDS AND POWDERS, INCLUDING PESTICIDES (5 hours, lecture)

A. DOT hazard classifications, placarding requirements

B. Environmental Protection Agency (EPA) pesticide classifications

1. Labeling requirements, signal words

2. Toxic ratings

3. Methods of manufacture

C. Typical shipping containers

D. Other physical properties

1. Flammability

2. Reactivity

3. Corrosiveness

E. Problems regarding poisoning

1. Special study of symptoms of poisoning by pesticides

2. First aid measures

F. Fireground tactics and procedures

X. RADIOACTIVE SUBSTANCES (5 hours, lecture)

A. DOT hazard classifications, placarding requirements

B. Brief discussion: radar terminology

1. Methods of measure

2. Types of radiation

C. Importance and differences in methods of detection

D. Theory of protection

1. Shielding

2. Distance

3. Time

E. Shipment containers

F. Radiation poisoning problems

G. Fireground tactics and procedures

1. Special cases: isolate and deny entry

2. Approach and contain

H. Responders and hazardous-material teams

XI. CORROSIVE MATERIALS (5 hours, lecture)

A. DOT hazard classifications, placarding requirements

B. Types of corrosive materials

1. Liquids

2. Solids

3. Gases

4. Other

C. Shipment containers

D. Unique problems associated with poisoning and personal injury

1. First aid for most exposures

2. First aid for alkali exposures

E. Other associated physical properties

1. Flammable and explosive tendencies

2. Reactivity

3. Oxidation and polymerization hazards

4. Problem of theory of dilution as a method of control

5. Compliance with EPA guidelines for neutralization

6. Who should/should not neutralize

7. Accurate neutralization consequences prediction

8. Conformance to state and federal anti-pollution statutes

	F. Fireground tactics and procedures
Total Lecture Hours:	54
Total Laboratory Hours:	0
Total Hours:	54
Primary Method of Evaluation:	1) Substantial writing assignments
Typical Assignment Using Primary Method of Evaluation:	Write a two to three page report which describes the composition of matter and the role of the atom, the elements and sub-atomic particles. Submit report to the instructor.
Critical Thinking Assignment 1:	Prepare a two-page report which describes the operating capabilities and limitations of a first responder to a hazardous materials incident. Submit to the instructor.
Critical Thinking Assignment 2:	Given an incident scenario, involving a specific hazardous material involved in fire, describe in a classroom setting, involved in properly managing and controlling the scene, minimizing civilian exposure, and fighting the fire, while protecting emergency personnel.
Other Evaluation Methods:	Class Performance, Completion, Homework Problems, Matching Items, Multiple Choice, Other Exams, Quizzes, Term or Other Papers, Written Homework
Instructional Methods:	Lecture, Multimedia presentations, Other (specify)
If other:	
Work Outside of Class:	Answer questions, Observation of or participation in an activity related to course content (such as theatre event, museum, concert, debate, meeting), Problem solving activity, Required reading, Skill practice, Study, Written work (such as essay/composition/report/analysis/research)
If Other:	
Up-To-Date Representative Textbooks:	California State Fire Training System (CSFTS), <u>FIRST RESPONDER OPERATIONAL</u> , California State Fire Training System, 2012. (Discipline Standard) United States Department of Transportation, <u>EMERGENCY RESPONSE GUIDEBOOK</u> , United States Department of Transportation, 2020. (Discipline Standard)
Alternative Textbooks:	
Required Supplementary Readings:	
Other Required Materials:	
Requisite:	
Category:	
Requisite course(s): List both prerequisites and corequisites in this box.	
Requisite and Matching skill(s): Bold the requisite skill. List	

the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable	
Requisite course:	Fire and Emergency Technology 1
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	<p>Ability to understand the stages and classifications of fire, fire development and fire cause determination.</p> <p>FTEC 1 - Compare and contrast the basic components of fire as a chemical reaction, the major phases of fire, and the main factors that influence fire spread and fire behavior.</p> <p>Ability to understand the effects of fire on the environment.</p> <p>FTEC 1 - Identify the effects of fire on the environment and historical efforts made to protect society.</p> <p>Ability to understand the tactics used in firefighting.</p> <p>FTEC 1 - Define firefighting strategy and tactics.</p> <p>Ability to describe the elements of firefighting safety.</p> <p>FTEC 1 - Describe the basic elements of firefighter safety and survival.</p>
Requisite Skill:	Elgibility for English 1A
Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable	<p>This course involves writing essays and fire related reports. A student's success in this class will be enhanced if they have these skills.</p> <p>Write a well-reasoned and supported essay that demonstrates application of the academic writing process.</p>
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Craig Neumann
Date:	02/01/1988
Original Board Approval Date:	
Last Reviewed and/or Revised by:	Tim Dennis

Date:	09/27/2018
Last Board Approval Date:	12/19/2022