



El Camino College
COURSE OUTLINE OF RECORD – Approved

I. GENERAL COURSE INFORMATION

Subject and Number: Fire and Emergency Technology 10
Descriptive Title: Hazardous Materials
Course Disciplines: Fire Technology or Environmental Technologies
Division: Industry and 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.

Conditions of Enrollment:

Recommended Preparation: Fire and Emergency Technology 1 and English A

Course Length:	<input checked="" type="checkbox"/> Full Term	Other (Specify number of weeks):
Hours Lecture:	3.00 hours per week	TBA
Hours Laboratory:	0 hours per week	TBA
Course Units:	3.00	

Grading Method: Letter
Credit Status: Associate Degree Credit

Transfer CSU: Effective Date: Prior to July 1992
Transfer UC: No

General Education:
El Camino College:

CSU GE:

IGETC:

II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

1. After the course of instruction the student will be able to describe the role of the First Responder.
2. The student will be able to identify three basic methods of spill containments.
3. The student will be able to identify five flammable liquids.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at <http://www.elcamino.edu/academics/slo/>.

B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Describe "Hazard Classes" used by the Department of Transportation.
Quizzes
2. Describe the United Nations Placarding and Labeling System.
Quizzes
3. Compare and contrast the basic physical properties and burning characteristics of the various classes of hazardous materials.
Term or other papers
4. Describe the need for incident control, including scene isolation and stabilization.
Oral exams
5. Analyze and choose acceptable methods of incident control measures for a variety of potential hazardous materials.
Term or other papers
6. Describe the importance of evacuation, non-commitment of fire fighting forces and total withdrawal procedures under certain hazardous materials conditions.
Quizzes
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.
Written homework
8. Describe the human health hazards and symptoms of exposure to chemical classes.
Presentation
9. List and compare safety considerations encountered by the fire department to ensure compliance with state and federal guidelines.
Written homework
10. Describe the legislative and legal authority controlling the actions of all agencies involved in incident control.
Presentation
11. Analyze case studies involving emergency hazardous material incidents. Develop management protocols For hazardous material incidents.
Essay exams

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	1	I	OVERVIEW OF HAZARDOUS MATERIALS A. First Responder Operations (FRO) B. Emergency Response Guidebook (ERG)
Lecture	10	II	REVIEW BASIC CHEMISTRY A. Composition of matter 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
Lecture	10	III	FLAMMABLE AND COMBUSTIBLE LIQUIDS 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
Lecture	5	IV	FLAMMABLE/NON-FLAMMABLE COMPRESSED GASES A. DOT hazard classifications, placarding

			<ul style="list-style-type: none"> requirements and definitions B. Flammable characteristics, physical properties C. Burning characteristics D. Dangers regarding compressed gas containers involved in fire <ul style="list-style-type: none"> 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
Lecture	5	V	<p>FLAMMABLE SOLIDS AND COMBUSTIBLE METALS</p> <ul style="list-style-type: none"> A. DOT hazard classifications, placarding requirements <ul style="list-style-type: none"> 1. Definitions 2. Typical containers and packaging B. Burning characteristics, other unique dangers <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 1. Special cases: water not allowed 2. Specialized extinguishing agents
Lecture	5	VI	<p>OXIDIZING AGENTS</p> <ul style="list-style-type: none"> A. DOT hazard classifications, placarding requirements and definitions B. Burning characteristics <ul style="list-style-type: none"> 1. Rule of "-ates" 2. Rules of "-ites" C. Problem of heat production and difficulty of extinguishment D. Fireground tactics and procedures <ul style="list-style-type: none"> 1. Special cases: volume of water inadequate 2. Special cases: extinguishment not advised
Lecture	1	VII	<p>INTRODUCTION TO TOXICOLOGICAL TERMINOLOGY</p> <ul style="list-style-type: none"> A. Threshold Limit Value (TLV) B. Parts Per Million (PPM) C. Lethal Dose 50% (LD/50) D. Immediately Dangerous to Life/Health (IDLH)
Lecture	2	VIII	<p>POISON CASES</p> <ul style="list-style-type: none"> A. DOT hazard classifications, placarding requirements <ul style="list-style-type: none"> 1. Definitions 2. Typical B. Burning characteristics C. Other chemical properties

			<ol style="list-style-type: none"> 1. Toxicity 2. Reactivity 3. Corrosiveness <p>D. Typical health hazards, dangers</p> <ol style="list-style-type: none"> 1. Symptoms of poisoning 2. First aid <p>E. Containment systems</p> <ol style="list-style-type: none"> 1. Size 2. Shape 3. Design <p>F. Fireground tactics and procedures</p>
Lecture	5	IX	<p>POISON LIQUIDS AND POWDERS, INCLUDING PESTICIDES</p> <p>A. DOT hazard classifications, placarding requirements</p> <p>B. Environmental Protection Agency (EPA) pesticide classifications</p> <ol style="list-style-type: none"> 1. Labeling requirements, signal words 2. Toxic ratings 3. Methods of manufacture <p>C. Typical shipping containers</p> <p>D. Other physical properties</p> <ol style="list-style-type: none"> 1. Flammability 2. Reactivity 3. Corrosiveness <p>E. Problems regarding poisoning</p> <ol style="list-style-type: none"> 1. Special study of symptoms of poisoning by pesticides 2. First aid measures <p>F. Fireground tactics and procedures</p>
Lecture	5	X	<p>RADIOACTIVE SUBSTANCES</p> <p>A. DOT hazard classifications, placarding requirements</p> <p>B. Brief discussion: radar terminology</p> <ol style="list-style-type: none"> 1. Methods of measure 2. Types of radiation <p>C. Importance and differences in methods of detection</p> <p>D. Theory of protection</p> <ol style="list-style-type: none"> 1. Shielding 2. Distance 3. Time <p>E. Shipment containers</p> <p>F. Radiation poisoning problems</p> <p>G. Fireground tactics and procedures</p> <ol style="list-style-type: none"> 1. Special cases: isolate and deny entry 2. Approach and contain <p>H. Responders and hazardous-material teams</p>
Lecture	5	XI	<p>CORROSIVE MATERIALS</p> <p>A. DOT hazard classifications, placarding requirements</p> <p>B. Types of corrosive materials</p>

			<ol style="list-style-type: none"> 1. Liquids 2. Solids 3. Gases 4. Other <p>C. Shipment containers</p> <p>D. Unique problems associated with poisoning and personal injury</p> <ol style="list-style-type: none"> 1. First aid for most exposures 2. First aid for alkali exposures <p>E. Other associated physical properties</p> <ol style="list-style-type: none"> 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 <p>F. Fireground tactics and procedures</p>
Total Lecture Hours		54	
Total Laboratory Hours		0	
Total Hours		54	

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. PRIMARY METHOD OF EVALUATION:

Substantial writing assignments

B. 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.

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

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.
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.

D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

Other exams
 Quizzes
 Written homework
 Class Performance
 Homework Problems

Term or other papers
Multiple Choice
Completion
Matching Items

V. INSTRUCTIONAL METHODS

Lecture
Multimedia presentations
Other (please specify)
FIELD ASSIGNMENTS
CLASS PARTICIPATION PROJECTS

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS

Study
Answer questions
Skill practice
Required reading
Problem solving activities
Written work
Observation of or participation in an activity related to course content

Estimated Independent Study Hours per Week: 6

VII. TEXTS AND MATERIALS

A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS

California State Fire Training System (CSFTS). FIRST RESPONDER OPERATIONAL. California State Fire Training System, 2012.
Qualifier Text: INDUSTRY STANDARD,
United States Department of Transportation. EMERGENCY RESPONSE GUIDEBOOK. United States Department of Transportation, 2018

B. ALTERNATIVE TEXTBOOKS

C. REQUIRED SUPPLEMENTARY READINGS

D. OTHER REQUIRED MATERIALS

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification
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B. Requisite Skills

Requisite Skills

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification
Course Recommended Preparation AND Fire and Emergency Technology-1	
Course Recommended Preparation English-A	

D. Recommended Skills

Recommended Skills
Ability to understand the stages and classifications of fire, fire development and fire cause determination. 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.
Ability to understand the effects of fire on the environment. FTEC 1 - Identify the effects of fire on the environment and historical efforts made to protect society.
Ability to understand the tactics used in firefighting. FTEC 1 - Define firefighting strategy and tactics.
Ability to describe the elements of firefighting safety. FTEC 1 - Describe the basic elements of firefighter safety and survival.
Ability to write a fire related report. ENGL A - Apply appropriate strategies in the writing process including prewriting, composing, revising, and editing techniques.

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact
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Course created by Craig Neumann on 02/01/1988.

BOARD APPROVAL DATE:

LAST BOARD APPROVAL DATE: 11/19/2018

Last Reviewed and/or Revised by: TIM DENNIS

Date: 09/27/2018

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