CENTRAL TEXAS COLLEGE
SYLLABUS FOR FIRT 1315
HAZARDOUS MATERIALS I

Semester Hour Credit: 3

INSTRUCTOR: _____

OFFICE HOURS: _____

I. INTRODUTION

A. This course is a study of hazardous chemicals characteristics and behavior of various materials. Topics include storage, transportation, handling hazardous emergency situation, and the most effective methods of hazard mitigation.

B. This is a required course for an Associate of Applied Science Degree in Fire Protection Technology.

C. This course is occupationally related and serves as preparation for careers in Fire Protection and Fire Service.

D. Prerequisites: None

E. Alphanumeric coding used throughout the syllabus denotes the integration of SCANS occupational competencies (C) and Fundamental Skills (S).

II. OVERALL OR GENERAL OBJECTIVES OF THE COURSE

Upon successful completion of this course, Hazardous Materials I, the student will be able to:

A. Recognize hazardous materials in various shipping and storage containers (C1, C3, C5-C9, C12-C14, F1-9)

B. Explain the chemical characteristics and how they may react under certain conditions (C1, C3, C5-7, C9, C12-14, F1, F2, F5, F6)

C. Describe the most effective methods of hazard mitigation (C1, C3, C5-C9, F1, F2, F5-F12, F13, F15)

III. INSTRUCTIONAL MATERIALS

The instructional materials identified for this course are viewable through www.ctcd.edu/books

Weber, Chris H., Hazardous Materials Operations, 2012, Brady / Pearson Publications, ISBN-10: 0132190273; ISBN-13: 9780132190275

IV. COURSE REQUIREMENTS

A. Your first responsibility is scholarship. The grade you receive for this course will not be the grade of the instructor, but rather the grade you and you alone earn.

B. You should attend class regularly and be prepared to participate in classroom discussions and to take unannounced quizzes relating to text assignments and lecture material presented from the beginning of the course.

C. You are encouraged to give your best effort throughout the semester. From the beginning, you should plan for a steady, organized, and continuous effort, which in the long run will prove more effective for your final grade than a last minute crash-cram policy. Your course grade is not determined solely by exam grade. Such factors as class participation, initiative, attendance, and individual research papers will be considered in grade computation.

D. From time to time, special library and/or outside assignments will be made to members of class individually and/or in groups. You are expected to read all assignments and fulfill your responsibilities to any group assignment.

E. You are expected to read all assigned materials and bring your textbook to class. Keep informed on all assignments, especially after an absence.

F. Good class notes are indispensable for earning a good grade, since both the material assigned and that discussed in class will be the basis for examination material.

G. You will be present for all examinations. (Changes may be made to course requirements or more may be added)

H. Special Work: A term paper or other research project, per requirements of the instructor, will be required. The subject must be appropriate for the course material. Check with the instructor when you have made a selection. The value is indicated in semester grade computation.

V. EXAMINATIONS

A. There will be a minimum of two major examinations, as follows:

1. Three-week exam (optional)
2. Mid-Term examination
3. Final examination

B. A student must be present for all examinations. No make-up examinations will be given. Students who know in advance that they will be absent from an examination do to valid reasons must arrange to take an early examination. Unexpected absencens due to illness or extenuating circumstances will require the student to see the instructor about individual make-up work.

C. Students without excused absences will be given a zero for the missed examination.

D. Examinations may consist of objective (true/false, multiple choice, fill-in-the-blank, and matching) or subjective (short answer and essay) questions, or a combination of both types. Students majoring in Fire Protection and Prevention must be able to communicate both orally and in written form, thus some questions requiring the composition and writing of an essay answer will be required.

VI. SEMESTER GRAD COMPUTATION

EXAM	POINTS	TOTAL POINTS	GRADES
Three-week (opt)	100 – 0	900-1,000	A=4pts/sem hr
Mid-Term exam	200 – 250	800- 899	B=3pts/sem hr
Final examination	300 – 350	700- 799	C=2pts/sem hr
Special Work	150 – 150	600- 699	D=1pt/sem hr
*Incentive Points	50 – 50	0- 599	F=0pts/sem hr
TOTAL	1000 1000		

* Incentive points are earned by doing special work on your own initiative, participating in class discussions, completing outside assignments, and having a good attendance record. Three points are deducted for each unexcused absence. Military assignments or unavoidable circumstances will be evaluated upon notification of the instructor.

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM COURSE INSTRUCTOR

A. Withdrawal from course: It is the student's responsibility to officially drop a class if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file an Central Texas College Application for Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

CTC Form 59 will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semesters. The deadline for sessions of other lengths is as follows:

10-week session	Friday of the 8th week
8-week session	Friday of the 6th week
5-week session	Friday of the 4th week

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule bulletin.

Students who officially withdraw will be awarded the grade of "W", provided the student's attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the college before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of "F" or "FN" for nonattendance.

B. An Administrative Withdrawal: An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on the Administrative Withdrawal Form for submission to the registrar.

C. An Incomplete Grade: The College catalog states, "An incomplete grade may be given in those cases where the student has completed the majority of the course work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course…" Prior approval from the instructor is required before the grade of "I" is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an "F" for the course.

D. Cellular Phone and Beepers: Cellular phones and beepers will be turned off while student is in the classroom or laboratory.

E. Americans With Disabilities Act (ADA): Disability Support Services provides services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at www.ctcd.edu/disbility-support for information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

VIII. COURSE OUTLINE

A. Unit One: Introduction

1. Unit Objectives: Upon successful completion of this unit, students will be able to:
   a. Describe the requirements of HAZWOPER in regard to hazardous materials emergency response and hazardous materials remediation work
   b. List the five levels of hazardous materials training
   c. Describe the training requirements at the hazardous materials awareness level
   d. Describe the training requirements at the hazardous materials operation level
   e. Summarize the requirements of the Resource Conservation and Recovery Act (RCRA)
   f. Summarize the requirements of the CERCLA and EPCRA
   g. Summarize the requirements of the Hazardous Materials Regulations (HMR)

h. Describe the differences between the HAZWOPER regulation and the NFPA 472 (2008) standard

2. Learning Activities:
   a. Discuss course requirements and grading
   b. Classroom lecture/discussion
   c. Reading assignment: Chapter One – pages 1-17

3. Unit Outline:
   a. Awareness Level Personnel versus Operation Level Personnel
   b. Legal Foundation of Hazardous Materials Response
   c. Hazardous Waste Operations and Emergency Response (HOZWOPER) 29 CFR 1910.120
   d. OSH Respiratory Protection 29 CFR 1910.134
   e. Resource Conservation and Recovery Act of 1976 (RCRA)
   f. Comprehensive Environment Response, Compensation, and Liability Act of 1980 (CERCLA)
   g. Superfund Amendments and Reauthorization Act of 1986 (SARA) and the Emergency Planning and Community Right-to-Know Act (EPCRA)
   h. The Hazardous Materials Regulations (HMR)
   i. National Fire Protection Association Standards
      1. NFPA 472 (2008 edition)
      2. NFPA 473 (2008 edition)
   j. Organizations that need to provide Hazardous Materials Awareness and Operations Training to employees

B. Unit Two: Awareness Level Personnel

1. Unit Objectives: Upon successful completion of this unit, students will be able to:
   a. Name the actions that personnel at the hazmat awareness level should perform when confronted by a hazardous materials spill or weapons of mass destruction (WMD) incident
   b. Name the four components of the acronym RAIN
   c. Describe five signs of a hazardous materials release
   d. List the four routes of entry
   e. Describe five sources of information about a hazardous materials spill or WMD incident
   f. Identify an unknown material using the *Emergency Response Guidebook* (ERG)
   g. List four types of weapons of mass destruction (WMD)

2. Learning Activities:
   a. Classroom lecture/discussion
   b. Reading assignment – Chapter 2, pages 18-55

3. Unit outline:

a. Dangers of Hazardous Materials
b. Location of Hazardous Materials
c. Recognition of Hazardous Materials Incidents
d. Routes of Entry
e. Marking Systems
    1. Hazard Classes and Divisions
        a. Class 1: Explosives
        b. Class 2: Gases
        c. Class 3: Flammable Liquids
        d. Class 4: Flammable Solids and Dangerous When Wet Materials
        e. Class 5: Oxidizing Substances and Organic Peroxides
        f. Class 6: Toxic Substances and Infectious Substances
        g. Class 7: Radioactive Materials
        h. Class 8: Corrosive Materials
        i. Class 9: Miscellaneous Hazardous Materials, Products, Substances, or Organisms
    2. The NFPA 704 Marking System
    3. Pipeline Markings
    4. Container Markings
    5. Material Safety Data Sheets (MSDS)
    6. Shipping Papers
    7. Military Marking
f. Use of the U. S. DOT *Emergency Response Guidebook*
    1. Evacuation verses In-Place Sheltering
    2. Emergency Response Plans and Site Safety Plans
g. Criminal or Terrorist Incidents involving Hazardous Materials or Weapons of Mass Destruction
    1. Chemical Agents
    2. Biological Agents
    3. Explosives
    4. Radiological Materials and Nuclear Incidents

C. <u>Unit Three</u>: Operational Level Responders Core Competencies: Recognizing Hazardous Materials

1. <u>Unit Objectives</u>: Upon successful completion of this unit, students will be able to:
    a. Read and interpret a pesticide label
    b. Recognize the different types of containers used to store hazardous materials
    c. Recognize the different types of intermodal containers from a distance
    d. Recognize the different types of highway cargo tankers at a distance
    e. Recognize different types of railcars from a distance
    f. Read and interpret shipping papers
    g. List the five different types of radioactive packaging and their features
    h. List the ways containers may fail and the dispersion patterns that could arise

i. List the five different categories of weapons of mass destruction, and name at least three agents in each class

2. Learning Activities:
   a. Classroom lecture/discussion
   b. Reading assignment – Chapter 3, pages 56-107

3. Unit Outline:
   a. Pesticide Labels
   b. Containers
      1. Non-Bulk Containers
      2. Intermediate Bulk Containers
      3. Fixed Site Storage Tanks
      4. Intermodal Tanks
         a. IM-101
         b. IM-102
         c. IMO Type 7
         d. DOT Spec 51
         e. Intermodal Tube Containers
      5. Highway Cargo Tankers
         a. DOT 406/MC 306 Cargo Tankers
         b. DOT 407/MC 307 Cargo Tankers
         c. DOT 412/MC 312
         d. MC 331
         e. MC 338
         f. Tube Trailers
         g. Dry Bulk Commodity Trailers
      6. Railroad Tank Cars
         a. Low-Pressure Tank Cars
         b. High Pressure Tank Cars
         c. Tank Car Markings
      7. Shipping Papers
         1. Highway: Bill of Lading
         2. Railroad: Consist
         3. Air: Air Bill
         4. Marine: Dangerous Cargo Manifest
      8. Radioactive Materials Packaging
         a. Interpreting Radioactive Placards and Labels
      9. Pipelines
      10. Container Failure
         a. Container Stress
            1. Thermal Stress
            2. Mechanical Stress
            3. Chemical Stress
         b. Container Breaching
            1. Container Release

2. Dispersion Patterns

11. Recognizing Terrorist Incidents and Criminal Events
    a. History of Terrorism using Chemical and Biological Agents
    b. Weapons of Mass Destruction and Toxic Industrial Materials
        1. Toxic Industrial Materials
        2. Chemical Warfare Agents
        3. Biological Warfare Agents
        4. Explosives
        5. Radiological Materials
12. Indicators of a Terrorist Incident

D. <u>Unit Four</u>: Operations Level Responders Core Competencies: Understanding Hazardous Materials

1. <u>Unit Objectives</u>: Upon successful completion of this unit, students will be able to:
    a. Use the current version of the NIOSH guide to research a hazardous material
    b. Use an MSDS sheet to research a hazardous material
    c. Use the program WISER to research a hazardous material
    d. Interpret the chemical and physical properties of any given hazardous material
    e. Determine how any given hazardous material will behave on contact with air
    f. Determine how any given hazardous material will behave on contact with water
    g. Determine the flammability properties of any given hazardous material
    h. Determine the chemical reactivity of any given hazardous material

2. <u>Learning Activities</u>:
    a. Classroom Lecture/Discussion
    b. Reading Assignment - Chapter 4, pages 108-142

3. <u>Unit Outline</u>:
    a. Using Reference Sources
        1. Using the NIOSH Guide
        2. Interpreting MSDS Sheets
        3. WISER Electronic Database
            a. Quick Start
            b. Known Substance
            c. Unknown Substance
            d. Contacting CHEMTREC (United States) or CANUTEC (Canada)
            e. Contacting the manufacturer and speaking with technical experts
    b. Chemical and Physical Properties
        1. States of Matter
        2. Gas and Vapor Behavior
            a. Vapor Pressure
            b. Vapor Density
        3. Water Behavior
            a. Water Reactivity

b. Water Solubility
c. Specific Gravity

4. Fire Behavior
   a. Flammable Range
   b. Flashpoint
   c. Ignition Temperature
   d. Boiling Liquid Expanding Vapor Explosions (BLEVEs)
   e. Chemical Reactivity
   f. Corrosives and the pH Scale
   g. Radiation

c. Health Effects of Hazardous Materials
d. Measurement of Health Effects
   1. Permissible Exposure Limit (PEL)
   2. Immediately Dangerous to Life and Health (IDLH)

E. <u>Unit Five</u>: Operations Level Responders Core Competencies: Responding to Hazardous Materials Incidents

1. <u>Unit Objectives</u>: Upon successful completion of this unit, students will be able to:
   a. Implement the incident command system (ICS) at a hazardous materials or WMD incident
   b. Institute scene control measures at a hazardous materials or WMD incident
   c. Formulate response objectives at a hazardous materials of WMD incident
   d. Describe the difference among life safety, incident stabilization, and property and environmental conservation objectives
   e. Describe the advantages and disadvantages of personal protective equipment (PPE) available for hazardous materials response
   f. Describe the advantages and disadvantages of available respiratory protection for hazardous materials response
   g. List the essential components of a safety briefing
   h. Describe the key features of a decontamination line

2. <u>Learning Activities</u>:
   a. Classroom lecture/discussion
   b. Reading assignment - Chapter 5, pages 143-188

3. <u>Unit Outline</u>:
   a. Dispatch and Response
   b. The Incident Management Process
   c. Establishing an Incident Command System (ICS)

1. Incident Command
2. Command Staff
   a. Safety Officer
   b. Liaison Officer
   c. Public Information Officer (PIO)

3. General Staff
    a. Operations Section
    b. Logistics Section
    c. Finance/Administration Section
    d. Planning Section
4. The Planning Process
    a. The Planning P
    b. Forming an Incident Action Plan
5. Documentation
    a. ICS Forms
6. Incident Command Facilities
    a. Incident Command Post (ICP)
    b. Emergency Operations Center (EOC)
    c. Staging Area
    d. Joint Information Center (JIC)
    d. Collecting and Analyzing Information
    e. Determining Response Objectives
        1. Life Safety
        2. Incident Stabilization
        3. Property and Environmental Conservation
        4. Managing Resources
        5. Evaluating the Planned Response
    f. Scene Control Procedures
        1. Immediate Isolation and the Use of Control Zones
        2. Downwind Evacuation
        3. In-Place Sheltering
    g. Personal Protective Equipment
        1. Respiratory Protection
            a. Particulate Respirator (Dust Mark)
            b. Air-Purifying Respirator (APR)
            c. Powered Air-Purifying Respirator (PAPR)
            d. Positive-Pressure Self-Contained Breathing Apparatus (SCBA)
            e. Positive-Pressure Air-Line Respirator with Escape Unit
            f. Closed Circuit SCBA
        2. Protective Clothing
            a. Thermal Protective Clothing
            b. Structural Firefighter Protective Clothing
            c. Chemical Protective Clothing (CPC)
        3. EPA Levels of Protection
            a. Level C
            b. Level B
            c. Level A
        4. Selecting Personal Protective Equipment
            a. Thermal Stress
        5. Using Personal Protective Equipment
            a. The Buddy System

b. Backup Teams
h. Safety Briefing
i. Victim Recovery and Triage
j. Formulating a Decontamination Plan
1. Emergency Decontamination
2. Technical Decontamination of Entry Team Members
a. Terminating the Incident
k. Operating at Criminal Incidents and WMD Incidents
1. Booby Traps and Secondary Devices
2. Evidence Preservation

F. Unit Six: Operations Level Responders Mission-Specific Competencies: Personal Protective Equipment

1. Unit Objectives: Upon successful completion of this unit, students will be able to:
   a. Select the appropriate respiratory protection for a given hazardous materials or MWD incident
   b. Select the appropriate chemical protective clothing (CPC) for a given hazardous materials or WMD incident
   c. Describe the types of thermal stress while wearing PPE and the dangers they pose
   d. Don and doff personal protective equipment (PPE)
   e. Describe how PPE should be stored and maintained
   f. Describe how PPE should be tested

2. Learning Activities:
   a. Classroom Lecture/Discussion
   b. Reading Assignment – Chapter 6, pages 189-225

3. Unit Outline:
   a. Types of Personal Protective Equipment (PPE)
      1. Respiratory Protection
         a. Air-Purifying Respirator (APR)
         b. Powered Air-Purifying Respirator (PAPR)
         c. Positive-Pressure Self-Contained Breathing Apparatus
         d. Positive-Pressure Air-Line Respirator with Escape Unit
         e. Closed-Circuit SCBA
      2. Thermal Protective Clothing
      3. Chemical Protective Clothing (CPC)
         a. Degradation
         b. Penetration
         c. Permeation
      4. Communications
      5. EPA Levels of Protection
         a. Level D
         b. Level C

c. Level B
d. Level A

6. NFPA Chemical Protective Clothing Standards
   a. NFPA 1991
   b. NFPA 1992
   c. NFPA 1994
   d. NFPA 1999
7. Specialty Suits
8. Hazards and PPE Options
   a. Simple Asphyxiating Hazards
   b. Chemical Hazards
   c. Thermal Hazards
   d. Mechanical Hazards
   e. Radiological Hazards
   f. Biological/Etiological Hazards

b. Limitations of Personal Protective Equipment
c. Physiological and Psychological Stresses
   1. Thermal Stress
      a. Heat Cramps and Heat Rash
      b. Heat Exhaustion
      c. Heatstroke
      d. Hypothermia
   2. Heat Exchange Units
      a. Air Colled
      b. Ice Cooled
      c. Water Cooled
      d. Phase Change Colers
   3. Psychological Stress
d. Technical Decontamination
e. Using PPE
   1. Selection of PPE
      a. Choosing a Respirator
      b. Choosing Chemical Protective Clothing (CPC)
      c. Choosing a PPE Ensemble (EPA Level of Protection)
   2. Donning and Doffing PPE
   3. Emergency Procedures
f. PPE Program
   1. Medical Surveillance Program
   2. Maintaining PPE

G. <u>Unit Seven</u>: Operations Level Responders Mission-Specific Competencies: Mass Decontamination

1. <u>Unit Objectives</u>: Upon successful completion of this unit, the student will be able to:
   a. Define a mass casualty incident

b. Plan for a mass casualty incident involving hazardous materials or WMD
c. Describe the equipment and methods needed to set up a mass decontamination line
d. Set up a mass decon line using available equipment
e. Describe crowd control procedures at a mass casualty incident
f. Perform scene control activities at a mass casualty incident
g. Describe why proper documentation is crucial during mass decon operations

2. Learning Activities:
   a. Classroom Lecture/Discussion
   b. Reading Assignment – Chapter seven, pages 226-241

3. Unit Outline:
   a. Mass Decontamination Operations
      1. PPE Selection
      2. Decontamination Supplies and Equipment
         a. Reconfigured Tents and Trailers
         b. Fire Engine Alley
         c. Pre-Plumbed Decontamination Corridors at Fixed Site Facilities
         d. Improvised Equipment and Methods.
      3. Decontamination Method Selection
         a. Dilution
         b. Washing
         c. Isolation
      4. Patient Treatment in the Hot and Warm Zones
      5. Crowd Management and Communications
      6. Evidence Preservation and Processing
      7. Evaluating Decontamination Effectiveness
      8. Patient Treatment Area
   b. Mass Decontamination Management
      1. Incident Management
      2. Reports and Supporting Documentation
         a. Personnel Exposure Records
         b. Activity Log
         c. Filing Documentation and Maintaining Records
      3. Special Considerations for Hospitals

H. Unit Eight: Review and Mid-Term Evaluation

1. Unit Objectives:
   a. Review materials from first seven chapters
   b. Discuss questions and major points

2. Learning Activities:
   a. Classroom Lecture/Discussion/Questions
   b. Reading Assignment – Chapters 1-7, pages 1-241

3. Unit Outline:
    a. Review and discuss all materials covered in the first seven chapters and answer and debate all questions
    b. Present and take examination
    c. Grade and discuss examination and record grades and evaluate performance

I. Unit Nine: Operations Level Responders Mission-Specific Competencies: Technical Decontamination

1. Unit Objectives: Upon successful completion of the unit, students will be able to:
    a. Explain why technical contamination is necessary at haz mats incidents
    b. Explain the differences between dry and wet decontamination
    c. Describe the equipment and tools necessary to perform tech decontamination
    d. Set up a technical decontamination line
    e. Perform technical decontamination on non-ambulatory personnel.
    f. Explain how to properly dispose of contaminated PPE, tools, equipment, and decontamination runoff.

2. Learning Activities:
    a. Classroom Lecture/Discussion
    b. Reading Assignment – Chapter 8, pages 242-261

3. Unit Outline:
    a. Decontamination Plan
    b. Technical Decontamination
        1. PPE Selection
        2. Decontamination Supplies and Equipment
            a. Dry Decontamination
            b. Wet Decontamination
        3. Decontamination Method Selection
            a. Absorption, Adsorption, and Solidification
            b. Dilution and Washing
            c. Evaporation
            d. Isolation and Disposal
            e. Chemical Degradation
            f. Vacuuming
        4. Evidence Preservation and Processing
        5. Supporting Hot Zone Operations
            a. Entry Team Members
            b. Ambulatory and Non-Ambulatory Victims
        6. Patient Treatment in the Warm Zone
            a. Evaluating Decontamination Effectiveness
    c. Technical Decontamination Management
        1. Incident Management
        2. Reports and Supporting Documentation

a. Personnel Exposure Records
b. Activity Log
c. Filing Documentation and Maintaining Records

J. <u>Unit Ten</u>: Operations Level Responders Mission-Specific Competencies: Evidence Preservation and Sampling

1. <u>Unit Objectives</u>: Upon successful completion of unit, students will be able to:
   a. List four types of hazardous materials and MWD crime scenes
   b. Describe the components of an effective site safety plan
   c. Describe how to avoid destroying or damaging evidence
   d. Describe methods to collect evidence that avoid cross contamination
   e. Explain field screening techniques for evidentiary samples
   f. Explain how 2-person sampling techniques help avoid cross contamination
   g. Describe the tools and equipment used in evidence collection
   h. Explain the significance of chain of custody
   i. Describe the packaging and shipping of contaminated evidence

2. <u>Learning Activities</u>:
   a. Classroom Lecture/Discussion
   b. Reading Assignment – Chapter 9, pages 262-282

3. <u>Unit Outline</u>:
   a. Types of Hazardous Materials and WMD Crime Scenes
      1. Suspicious Letters and Packages
      2. Illicit Laboratory
      3. WMD Release or Attack
      4. Environmental Crimes
   b. Evidence Collection Versus Public Safety Sampling
   c. Preparation and Planning
1. Site Safety Plan
      a. Incident Command System
      b. Decontamination
      c. Documentation
   d. Response
      1. Ensuring Scene Safety
         a. Booby Traps and Secondary Devices
         b. Continuous Air Monitoring
         c. Personal Protective Equipment (PPE)
      2. Preserving the Crime Scene
      3. Identification of Samples for Evidence Collection
         a. Evidence
         b. Container Handling
         c. Sample Identification
      4. Field Screening of Samples
      5. Evidentiary Sample Collection

a. Two-Person Evidence Collection Technique
b. Sampling Gases or Vapors
c. Sampling Liquids
d. Sampling Solids
6. Decontamination of Evidence
7. Packaging of Evidence for Transport

K. Unit Eleven: Operations Level Responders Mission-Specific Competencies: Product Control

1. Unit Objectives: Upon successful completion of this unit, students will be able to:

a. Describe the planning requirements to successfully apply product control techniques at hazardous materials incidents

b. List eight different product control options available to the hazardous materials operation level responder

c. Explain the importance of remote valve shutoff in product control
d. Explain three techniques to control moving liquids
e. Explain three techniques to control hazardous materials in bodies of water
f. Explain two techniques to control vapors
g. Describe the types of foam and their uses.

2. Learning Activities:
a. Classroom Lecture/Discussion
b. Reading Assignment – Chapter 10, pages 283-300

3. Unit Outline:
a. Preparation and Planning
1. Work Practices
b. Control Options
1. Remote Valve Shutoff
a. Transportation
b. Fixed Site Facilities
2. Dilution
3. Absorption, Adsorption, and Solidification
4. Diking
5. Retention, Damming, and Diversion
6. Booming
7. Vapor Suppression
a. Aqueous Film-Forming Foam (AFFF)
b. Alcohol Resistant Foam (ARF)
c. Fluoroprotein Foam
d. High Expansion Foam
8. Vapor Dispersion

L. Unit Twelve: Operations Level Responders Mission-Specific Competencies: Air Monitoring and Sampling

1. Unit Objectives: Upon successful completion of this unit, students will be able to:
   a. Describe five reasons air monitoring is important
   b. State the appropriate order of air monitoring and the reasons for this order
   c. Describe the advantages and disadvantages of Gieger counters
   d. Describe the advantages and disadvantages of pH paper
   e. Describe the advantages and disadvantages of combustible gas indicators
   f. Describe the advantages and disadvantages of electrochemical sensors
   g. Describe the advantages and disadvantages of photoionization detectors
   h. Describe the advantages and disadvantages of colorimetric tubes
   i. Perform effective air-monitoring operations
   j. Describe the advantages and disadvantages of Raman spectroscopy

2. Learning Activities:
   a. Classroom Lecture/Discussion
   b. Reading assignment – Chapter 11, pages 301-333

3. Unit Outline:
   a. Preparation and Planning
   b. Air-Monitoring Procedures
      1. Order of Air Monitoring
         a. Radiation (from a distance, before approaching the suspected hot zone)
         b. Corrosive atmospheres
         c. Oxygen
         d. Flammable atmospheres
         e. Toxic atmospheres
      2. Data Quality Objectives (DQOs)
      3. Calibration
      4. Bump Checking and Field Zeroing
      5. Reaction Time and Recovery Time
      6. Correction Factors
      7. Action Levels
         a. Air-Monitoring Equipment
            1. Radiation Detection
               a. Geiger-Mueller Tubes
               b. Scintillation Counters
               c. Dosimeters
         b. Corrosive Materials Detection
         c. Oxygen (O_2) Sensors
         d. Combustible Gas Indicators (CGIs)
         e. Toxics Detection
            1. Electrochemical Sensors
            2. Photoionization Detectors
            3. Colorimetric Tubes
            4. Ion Mobility Spectroscopy (IMS)
   c. Sample Collection of Unknown Materials

1. Sampling Procedures: Two-Person Technique
    a. Gases
    b. Liquids
    c. Solids
d. Solid and Liquid Sample Identification
    1. Raman Spectroscopy
    2. Fourier Transform Infrared (FTIR) Spectroscopy
e. Documentation and Data Sharing

M. <u>Unit Thirteen</u>: Operations Level Responders Mission-Specific Competencies: Victim Rescue and Recovery

1. <u>Unit Objectives</u>: Upon successful competition of this unit, students will be able to:
    a. List 11 factors affecting the feasibility of victim rescue
    b. List four victim considerations that should be taken into account when mobilizing for victim rescue
    c. Describe the essential components of hot zone medical treatment
    d. Describe the 3/30 rule of 2003 and its implications for victim rescue and recovery at WMD incidents
    e. Describe four ways emergency decontamination may be performed
    f. Describe four methods of removing a victim from the hot zone
    g. Describe the victim retrieval devices and their use

2. <u>Learning Objectives</u>:
    a. Classroom Lecture/Discussion
    b. Reading Assignment – Chapter 12, pages334-354

3. <u>Unit Outline</u>:
    a. Preparation and Planning
        1. Feasibility
        2. Safety Procedures
            a. The Buddy System
            b. Backup Teams
            c. Safety Briefing
        3. Rescue Team Organization
            a. Industrial Facility Emergencies
            b. Confined Space Incidents
            c. Terrorist and Weapons of Mass Destruction (WMD) Incidents
        4. Incident Response Considerations
            a. Victim Considerations
            b. Hot Zone Treatment
            c. Personal Protective Equipment
            d. Rescue and the 3/30 Rule of 2003
    b. Emergency Decontamination
    c. Victim Rescue Techniques and Equipment

1. Victim Condition
   a. Ambulatory Victims
   b. Non-ambulatory Victims
2. Victim Removal Equipment and Techniques
   a. Lifts, Carries, and Drags
   b. Victim Retrieval Devices (VDR) and Rescue Equipment
   c. Assembly-Line Hot Zone Victim Removal Using Mechanical Devices

N. <u>Unit Fourteen</u>: Operations Level Responders Mission-Specific Competencies: Illicit Laboratory Incidents

1. <u>Unit Objecttives</u>: Upon successful completion of this unit, students will be able to:
   a. Describe the types of chemicals that may be found in illicit laboratories
   b. Describe the type of equipment that may be found in illicit laboratories
   c. Describe the dangers that illicit laboratories pose to the first responder
   d. Define the unique indicators of a clandestine metamphetamine lab
   e. Compare and contrast illegal drug, chemical warfare agent (CWA), biological warfare agent (BWA), explosive, and radiological dispersion device (RDD) labs
   f. Describe the types of booby traps and secondary devices that may be found in illicit labs
   g. List the safety considerations before entering and operating in illicit labs
   h. List the four possible dangers from handling containers in illicit labs

2. <u>Learning Objectives</u>:
   a. Classroom Lecture/Discussion
   b. Reading Assignment – Chapter 13, pages 355-388

3. <u>Unit Outline</u>:
   a. Illicit Laboratory Recognition and Identification
      1. Clandestine Laboratory Configuration
         a. Chemicals
         b. Glassware and Equipment
      2. Methamphetamine Labs
         a. Ephedrine and Pseudoephedrine Reduction Method
         b. Anhydrous Ammonia or “Nazi” Method
         c. Red P Method
         d. One Pot Method
         e. Phenyl-2-Propanone (P2P) Reduction Method
      3. Other Illegal Drug Labs
         a. Ecstasy (MDMA) and MDA
         b. Fentanyl
         c. PCP
         d. GHB
         e. CAT

4. Chemical Agent Labs
    a. Blood Agents
    b. Vesicants
    c. Nerve Agents
5. Biological Agent Labs
    a. Bacteria
    b. Viruses
    c. Toxins
6. Explosives Labs
    a. Nitrated Explosives
    b. Peroxide Explosives
    c. Radiological Dispersal Devices (RDDs)

b. Preparation and Planning

c. Response
    1. Booby Traps and Secondary Devices
    2. Reconnaissance and Initial Laboratory Characterization
        a. Air Monitoring
        b. Personal Protective Equipment
        c. Decontamination
    3. Laboratory Processing
        a. Container Handling
        b. Sample Identification
        c. Evidence Collection

d. Remediation Plan

O. <u>Unit Fifteen</u>: Course Review and Discussion

1. <u>Unit Objectives</u>:
    a. Cover and discussion all materials from the course
    b. Explain solutions to all questions and misunderstanding
    c. Prepare for final examination

2. <u>Learning Objectives</u>:
    a. Classroom Questions and Discussion lead by the instructor
    b. Reading Assignment – Mid-Term and entire textbook

P. <u>Unit Sixteen</u>: Final Examination and Grade Assignment

1. <u>Unit Objectives</u>: Upon completion of this course, students will be able to:
    a. Describe the operations of a Hazardous Materials Unit
    b. Describe the components of the hazardous materials operations
    c. Recognize hazardous materials in various shipping and storage containers
    d. Explain the chemical characteristics and how they may react under certain conditions
    e. Describe the most effective methods of hazard mitigation

2. Learning Objectives:
   a. Evaluate the comprehension and retention of course materials

3. Unit Outline:
   a. Administer Final Examination
   b. Grade Examinations
   c. Return Examinations to students and discuss questions and grading
   d. Assign final course grades and share individually with students
   e. Dismiss the class