

THE UNIVERSITY OF AKRON
College of Health & Human Sciences
Fire Protection Technology

Course Name: Hazardous Materials
Course Number: 2230-250
Course Credit: 4 credit hours
Prerequisites: 2230:100 Introduction to Fire Protection

Course Description:

This course provides basic chemistry relating to the categories of Hazardous materials including recognition, identification, reactivity, and health hazards encountered by emergency services. Emphasis on emergency situations, fire control and containment of the chemical.

Program Outcomes: Upon complete of this course, the student will be able to:

1. Describe containers associated with hazardous materials
2. Identify the 9 hazard classes for chemicals
3. Utilize the periodic table to identify potential chemicals elements and families
4. Appropriate actions for fire and spills of hazardous materials
5. Correct Environmental response for spills and releases.
6. Use of the Incident Command System for incidents.
7. Appropriate personnel protective equipment for the Hazardous Materials

ASSESSMENT:

At the beginning of the semester, the instructor will discuss the format used to evaluate student performance and progress .The criteria for assigning a course grade shall also be discussed. A hard copy and electronic copy of the course syllabus will be provided on Springboard. Assessment methods may include one or more of the following: research papers, book and journal article reviews, written and oral reports, table top exercises, community service projects, and classroom presentations.

Grading Scale:

A 97 – 100	C 75 – 77
A- 94 – 96	C- 72 – 74
B+ 90 – 93	D 70 – 71
B 86 – 89	D- 69
B- 82 – 85	F 68
C+ 78 – 81	

Course Outline

I. Introduction

- A. General Characteristics of Hazardous Materials
- B. Hazardous Household Products
- C. Hazardous Substances in the Workplace
- D. Hazardous Materials in Transit
- E. Hazardous Materials within Communities
- F. NFPA System of Identifying Potential Hazards

II. Matter and Energy

- A. Matter and Energy Defined
- B. Common Units of Measurement
- C. Temperature, Pressure, and Volume Relationships
- D. Heat Transmission
- E. Understanding Fluid Principles

III. Chemical Forms of Matter

- A. Elements and Compounds
- B. Periodic Classification of Elements
- C. The Nature of Chemical Bonding
- D. Writing Chemical Formulas
- E. Naming Ionic and Covalent Compounds

IV. Principles of Chemical Reactions

- A. Types of Chemical Reactions
- B. Factors Affecting the Rate of Reaction
- C. Oxidation-Reduction Reactions
- D. Fire Extinguishing Agents

V. Chemistry of Some Common Elements

- A. Oxygen
- B. Hydrogen
- C. Fluorine
- D. Chlorine
- E. Phosphorus
- F. Sulfur
- G. Carbon

VI. Flammable Gases and Liquids

- A. Flammability
- B. General Hazards of Compressed Gases
- C. Storage and Transport of Compressed Gases
- D. General Hazards of Flammable Liquids
- E. Storage and Transport of Flammable Liquids
- F. Response to Flammable Gas and Liquid Emergencies

VII. Chemistry of Some Hazardous Organic Compounds

- A. The Nature of Organic Compounds
- B. Aliphatic Hydrocarbons
- C. Aromatic Hydrocarbons
- D. Functional Groups
- E. Halogenated Hydrocarbons
- F. Alcohols
- G. Ethers
- H. Aldehydes and Ketones
- I. Organic Acids
- J. Esters
- K. Amines
- L. Peroxo-Organic Compounds

VIII. Chemistry of Some Corrosive Materials

- A. The Nature of Acids and Bases
- B. The PH Scale
- C. Acids and Bases as Corrosive Materials
- D. Sulfuric Acid
- E. Nitric Acid
- F. Hydrochloric Acid
- G. Perchloric Acid
- H. Hydrofluoric Acid
- I. Phosphoric Acid
- J. Acetic Acid
- K. Alkaline Metal Hydroxides
- L. Response to Corrosive Material Emergencies

IX. Chemistry of Some Water-Reactive Materials

- A. The Nature of Water Reactive Materials
- B. Alkali Metals
- C. Combustible Metals
- D. Metallic Hydrides
- E. Metallic Phosphides
- F. Metallic Carbides

X. U.S. Department of Transportation Hazard Classes and Their Divisions

- A. Identification of Hazardous Materials by Container Shape and Size
- B. Identification of Hazardous Materials by Transportation Placards
- C. Identification of Hazardous Materials by Shipping Documents
- D. Identification of Hazardous Materials by Material Safety Data Sheets (MSDS)

XI. Hazardous Materials in Fixed Facilities

- A. Identification of Hazardous Materials by Location and Occupancy
- B. Identification of Hazardous Materials by Container Shape and Size

- C. Identification of Hazardous Materials by NFPA 704 System
- D. Identification of Hazardous Materials by Material Safety Data Sheets (MSDS)

XII. Response Guidelines

- A. Utilization of North American Emergency Response Guidebook
- B. Utilization of NIOSH Pocket Guide to Chemical Hazards
- C. Utilization of NFPA Fire Protection Guide to Hazardous Materials
- D. Utilization of Bureau of Explosives Emergency Action Guides

Special accommodations:

If there are special circumstances which affect your learning in this class, please let me know as soon as possible. Accommodations can be arranged through the Office of Accessibility, located in Simmons Hall 105 (x7928).