

**LAST REVIEW:** 2008 - 2009      **NEXT REVIEW:** 2013 - 2014      **STATUS:** A

**COURSE TITLE:** Hazardous Materials I

**COMMON COURSE NUMBER:** FFP 2401

**CREDIT HOURS:** 3

**CONTACT HOUR BREAKDOWN**

*(per 16 week term)*

**CLOCK HOURS:**

*(Voc. Course ONLY)*

Lecture: **48**

Lab:

Clinic:

Other:

**PREREQUISITE(S):** NONE

**COREQUISITE(S):** NONE

**PRE/COREQUISITE(S):**

**COURSE DESCRIPTION** *(750 characters, maximum):*

Study of types of chemicals and processes, storage, and transportation of chemicals; hazards of radioactive materials; precautions to be taken in fire fighting involving hazardous materials; laws of federal, state and local levels pertaining to such materials.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s):      Area

General Education Requirements – Associate in Science Degree (AS), meets Area(s):      Area

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s):      Area

## **UNIT TITLES**

1. Chemistry of Fire
2. Properties of All Flammable Liquids
3. Flammable Liquids and Flammable Liquids in Bulk
4. Pressurized and Liquefied Gases
5. Flammable Solids Including Metals
6. Cryogenics
7. Plastics
8. Oxidizing Agents

## EVALUATION:

Please provide a brief description (250 characters maximum) that details how students will be evaluated on the course outcomes.

1. Quizzes, Test, and/or Final Exam (cumulative/comprehensive);
2. Selected faculty may assess homework, projects, class participation/attendance, and/or extra credit projects.

*\*\*\* Complete the following only if course is seeking general education status \*\*\**

## GENERAL EDUCATION Competencies and Skills \*:

Please highlight in **green** font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Write clearly and coherently	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	
5. Demonstrate and apply literacy in its various forms: (highlight in <b>green</b> ALL that apply) ( 1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental )	
6. Apply problem solving techniques to real-world experiences	
7. Apply methods of scientific inquiry	
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	

*\* General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*

## **UNITS**

### **Unit 1 Chemistry of Fire**

#### **General Outcome:**

- 1.0 The students should be able to describe how fires start and why they can be extinguished.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 1.1 Define terms e.g. combustion, oxidation.
- 1.2 Describe the fire triangle.
- 1.3 Understand chemical formulast equations.
- 1.4 Discuss methods of heat transfer, methods of heat generation, the chemistry of extinguishment, how chemicals combine, and how to convert centigrade to Fahrenheit.

**Common Course Number: FFP 2401**

**Unit 2 Properties of All Flammable Liquids**

**General Outcome:**

2.0 The students should be able to discuss the properties of all flammable liquids.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 2.1 Classify flammable and combustible liquids.
- 2.2 Discuss factors governing the action of flammable and combustible liquids such as fresh paint.
- 2.3 Describe physical properties of liquids relating to extinguishment.
- 2.4 Explain why a liquid is flammable and how spontaneous combustion occurs.

**Common Course Number: FFP 2401**

**Unit 3 Flammable Liquid and Flammable Liquids in Bulk**

**General Outcome:**

3.0 The students should be able to discuss the properties of some groups of flammable liquids and the requirements for their bulk storage.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 3.1 Discuss paraffin hydrocarbons.
- 3.2 Identify the chemical makeup of alcohol.
- 3.3 Cite the importance of water supply in bulk storage.
- 3.4 List the dangers of drum storage.
- 3.5 Identify problems in tank truck emergencies.
- 3.6 Discuss remote problems in service stations.
- 3.7 Describe the structure and danger of ring hydrocarbons.
- 3.8 Recognize dangers connected with individual members of this group.

**Common Course Number: FFP 2401**

**Unit 4 Pressurized and Liquefied Gases**

**General Outcome:**

4.0 The students should be able to relate the principles and dangers of pressurized and liquefied gases.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 4.1 Define general principles of gases.
- 4.2 Explain the gas laws.
- 4.3 Describe methods of increasing gas pressure.
- 4.4 Describe hazardous properties of gases.
- 4.5 Describe critical temperature and its application to liquidification
- 4.6 Discuss principles of refrigeration.
- 4.7 Describe the use of treons in refrigeration.
- 4.8 Discuss other refrigerants used and their dangers.

**Unit 5 Flammable Solids Including Metals**

**General Outcome:**

5.0 The students should be able to detail the problems characteristic of fires that involve combustible solids and metals.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 5.1 List general characteristics of flammable solids.
- 5.2 Describe the element carbon and its many compounds.
- 5.3 Discuss dangers of the element phosphorous and its uses.
- 5.4 Describe the element sulphur and its properties.
- 5.5 Describe physical properties of all metals.
- 5.6 Identify hazards inherent to some metals.
- 5.7 Explain the hazards of water on some metallic elements.
- 5.8 Examine the toxicity of certain metals.

**Unit 6 Cryogenics and Their Applications**

**General Outcome:**

6.0 The students should be able to discuss the hazards associated with low temperature materials.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

6.1 Discuss the hazards associated with cryogenic gases.

6.2 Describe precautions to be taken before entering a liquid nitrogen atmosphere.

6.3 Identify the health hazard of nonflammable cryogenic gases.

6.4 Explain how liquid oxygen increases the burning rate of materials.

**Unit 7 Plastics**

**General Outcome:**

- 7.0 The students should be able to discuss the dangers connected with the manufacture of plastic resins and fire fighting techniques appropriate to fires involving plastics.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 7.1 Describe the dangers in the polymerization process.
- 7.2 Discuss dangers of nitrocellulose.
- 7.3 Explain how to fight nitrocellulose fires.
- 7.4 Relate how to identify various groups of plastics.
- 7.5 Identify how to classify plastics by their chemical make-up.

**Unit 8 Oxidizing Agents**

**General Outcome:**

8.0 The students should be able to identify oxidizing agents and discuss their dangers in a fire area.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 8.1 Explain how an oxidizer is built.
- 8.2 Distinguish between an organic and inorganic oxidizer.
- 8.3 Discuss the peroxide fire and explosion hazards.
- 8.4 Describe the nitrate group and its dangers.
- 8.5 Describe emergency procedures in potential nitrate bath explosions.