

College of San Mateo
Official Course Outline

1. **COURSE ID:** FIRE 730 **TITLE:** Fire Behavior and Combustion **C-ID:** FIRE 140X
Units: 3.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; and 96.0-108.0 Homework hours
Method of Grading: Letter Grade Only
Recommended Preparation:
 Eligibility for ENGL 100 or 105. FIRE 715

2. **COURSE DESIGNATION:**
Degree Credit
Transfer credit: CSU

3. **COURSE DESCRIPTIONS:**
Catalog Description:
 This course explores the theories and fundamentals of how and why fires start, spread and are controlled.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
Upon successful completion of this course, a student will meet the following outcomes:
 1. Identify the fundamental theories of fire behavior and combustion
 2. Differentiate the various types of extinguishing agents

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
Upon successful completion of this course, a student will be able to:
 1. Identify the fundamental theories of fire behavior and combustion.
 2. Differentiate the various types of extinguishing agents.

6. **COURSE CONTENT:**
Lecture Content:
1. Introduction
 - A. Matter and Energy
 - B. The Atom and its Parts
 - C. Chemical Symbols
 - a. Chemical Equations
 - b. Periodic Chart
 - c. Atomic Weights/Mass
 - D. Molecules
 - E. Energy and Work
 - F. Forms of Energy
 - a. Source of Energy
 - b. Sources of Ignition
 - G. Transformation of Energy
 - H. Laws of Energy
 2. Units Measurements
 - A. International (SI) Systems of Measurement
 - a. Units of Measurement for Mass/Energy
 - B. English Units of Measurement
 - a. Length, Size, Area, Volume
 - b. Weight, Flow Rates, Pressure
 3. Chemical Reactions
 - A. Physical States of Matter
 - B. Compounds and Mixtures
 - C. Solutions and Solvents
 - D. Process of Reactions
 - a. Oxidation/Reduction
 - b. Combustion
 - c. Exothermic/Endothermic
 4. Fire and the Physical World
 - A. Characteristics of Fire

- B. Characteristics of Solids
- C. Characteristics of Liquids
- D. Characteristics of Gases
- 5. Heat and its Effects
 - A. Production and Measurement of Heat
 - B. Different Kinds of Heat
 - a. Heat of Combustion
 - b. Heat of Solution
 - c. Heat of Vaporization
 - d. Specific Heat
- 6. Properties of Solid Materials
 - A. Common Combustible Solids
 - B. Plastic and Polymers
 - C. Combustible Metals
 - D. Combustible Dust
- 7. Common Flammable Liquids and Gases
 - A. General Properties of Gases
 - B. The Gas Laws
 - C. Classification of Gases
 - D. Compressed Gases
- 8. Fire Behavior
 - A. Stages of Fire
 - B. Fire Phenomena
 - a. Flashover
 - b. Backdraft
 - c. Rollover
 - d. Flameover
 - C. Fire Plumes
- 9. Fire Extinguishment
 - A. The Combustion Process
 - B. The Character of Flame
 - C. Fire Extinguishment
- 10. Extinguishing Agents
 - A. Water
 - B. Foams and Wetting Agents
 - C. Inert Gas Extinguishing Agents
 - D. Halogenated Extinguishing Agents
 - E. Dry Chemical Extinguishing Agents
 - F. Dry Powder Extinguishing Agents
- 11. Hazards by Classification Types
 - A. Hazards of Explosives
 - B. Hazards of Compressed and Liquefied Gases
 - C. Hazards of Flammable and Combustible Liquids
 - D. Hazards of Flammable Solids
 - E. Hazards of Oxidizing Agents
 - F. Hazards of Poison
 - G. Hazards of Radioactive Substances
 - H. Hazards of Corrosives

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Activity
- C. Discussion

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Presentation topic description and outline

Reading Assignments:

Assigned reading for class session

Other Outside Assignments:

Preparation of oral presentation

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Oral Presentation
- B. Quizzes
- C. Written examination

10. REPRESENTATIVE TEXT(S):

Possible textbooks include:

- A. Gorbett, G. E.. *Fire Dynamics*, 2nd ed. Pearson, 2016
- B. Gann, R.; Friedman, R.; National Fire Protection Association. *Principles of Fire Behavior and Combustion*, 4th ed. Jones & Bartlett Learning, 2015
- C. Quintiere, J. G.. *Principles of Fire Behavior*, 2nd ed. CRC Press, 2016

Origination Date: August 2020

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Course Originator: Michelle Schneider