College of San Mateo  
Official Course Outline

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

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 physical properties of the three states of matter  
   2. Categorize the components of fire  
   3. Explain the physical and chemical properties of fire  
   4. Describe and apply the process of burning  
   5. Define and use basic terms and concepts associated with the chemistry and dynamics of fire  
   6. Discuss various materials and their relationships to fire as fuel  
   7. Demonstrate knowledge of the characteristics of water as a fire suppression agent  
   8. Articulate other suppression agents and strategies  
   9. Compare other methods and techniques of fire extinguishments

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:


**Origination Date:** September 2014
**Curriculum Committee Approval Date:** October 2014
**Effective Term:** Fall 2015
**Course Originator:** Michelle Schneider