**J. Sargeant Reynolds Community College**
**Course Content Summary**

**Course Prefix and Number: FST 110 Credits: 3**

**Course Title: Fire Behavior and Combustion**

**Course Description:**

Explores the theories and fundamentals of how and why fires start, spread, and how they are controlled. Lecture 3 hours per week.

**General Course Purpose:**

Prepares students for upper division undergraduate study of fire dynamics.

**Course Prerequisites and Co-requisites:**

None

**Student Learning Outcomes:**
Upon completion of this course, you will be able to:

- Identify physical properties of the three states of matter;
- Categorize the components of fire;
- Explain the physical and chemical properties of fire;
- Describe and apply the process of burning;
- Define and use basic terms and concepts associated with the chemistry and dynamics of fire;
- Explain the effect and dangers of air movement on the combustion process;
- Discuss various materials and their relationship to fires as fuel;
- Demonstrate knowledge of the characteristics of water as a fire suppression agent;
- Articulate other suppression agents and strategies;
- Compare other methods and techniques of fire extinguishments.

**Major Topics to Be Included:**

1. Introduction.
    a. Matter and Energy
    b. The Atom and its Parts
    c. Chemical Symbols
    d. Molecules
    e. Energy and Work
    f. Forms of Energy
    g. Transformation of Energy
    h. Laws of Energy

2. Units of Measurements.

a. International Systems (SI) of Measurement
b. English Units of Measurement

3. Chemical Reactions.
    a. Physical States of Matter
    b. Compounds and Mixtures
    c. Solutions and Solvents
    d. Process of Reactions

4. Fire and the Physical World
    a. Characteristics of Fire
    b. Characteristics of Solids Characteristics of Liquids
    c. Characteristics of Gases

5. Heat and its Effects
    a. Production and Measurement of Heat
    b. Different Kinds of 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
9. Fire Phenomena
    10. Flashover
    11. Backdraft
        i. Rollover
        ii. Flameover
        iii. Heat Flow
    b. Fire Plumes

12. Fire Extinguishment
    a. The Combustion Process
    b. The Character of Flame
    c. Fire Extinguishment

13. Extinguishing Agents
    a. Water
    b. Foams and Wetting Agents
    c. Inert Gas Extinguishing Agents
        i. Halogenated Extinguishing Agents
    d. Dry Chemical Extinguishing Agents
    e. Dry Powder Extinguishing Agents

14. 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 Poisons
    g. Hazards of Radioactive Substances
    h. Hazards of Corrosives

**Effective Date/Updated:** September 11, 2023