

**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