

# FIRE 205 : FIRE BEHAVIOR & COMBUSTION

## Transcript title

Fire Behavior Combustion

## Credits

3

## Grading mode

Standard letter grades

## Total contact hours

30

## Lecture hours

30

## Prerequisites

FIRE 104, FIRE 105, FIRE 110, and FIRE 120.

## Recommended preparation

MTH 105.

## Course Description

Explores theories and fundamentals of how and why fires start, how they spread, and how they are controlled. Introduces the basic principles of chemistry and physics that govern fire behavior. Examine the properties of combustion products, fire-extinguishing agents, and the three states of matter. Fire and Emergency Services Higher Education (FESHE) core requirement equivalent to NFA C0276.

## Course learning outcomes

1. Identify the fundamental theories of fire behavior and combustion.
2. Differentiate the various types of extinguishing agents.
3. Explain the principles of physics and chemistry related to fire combustion and extinguishing agents.
4. Apply the principles of chemistry and physics to explain the formation, spread, and control of fire.

## Content outline

The learning outcomes are those of the National Fire Academy (NFA).

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 measurement
  - a. International (SI) systems 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
  - c. Characteristics of liquids
  - d. 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
  - b. Fire phenomena
    - i. Flashover
    - ii. Backdraft
    - iii. Rollover
    - iv. Flame over
  - 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 poisons
  - g. Hazards of radioactive substances
  - h. Hazards of corrosives

## **Required materials**

This course requires students to purchase a textbook.