

**FIP 128**  
**DETECTION AND INVESTIGATION**

**COURSE DESCRIPTION:**

Prerequisite: None

Corequisite: None

This course covers procedures for determining the origin and cause of accidental and incendiary fires. Topics include collection and preservation of evidence, detection and determination of accelerants, courtroom procedure and testimony, and documentation of the fire scene. Upon completion, students should be able to conduct a competent fire investigation and present those findings to appropriate officials or equivalent, meeting NFPA 1021. *This course is also available through the Virtual Learning Community (VLC).* Course Hours Per Week: Class, 3. Semester Hours Credit, 3.

**COURSE OBJECTIVES**

Upon completion of this course, the students will be able to:

- a. Apply investigative techniques.
- b. Determine cause and origin of fire.
- c. Preserve evidence of cause.
- d. Identify evidence of possible arson.
- e. Identify behavioral characteristics of the arsonist.
- f. Determine fires-setting methods.
- g. Prepare investigation reports.
- h. Prepare for court action.
- i. Use various investigative equipment.
- j. Coordinate investigations with other agencies.

**OUTLINE OF INSTRUCTION:**

- I. Arson investigation
  - a. The fire problem
  - b. The detection of incendiary fires
  - c. Analytical fire investigation
  
- II. The elementary chemistry of combustion
  - a. Atoms, elements, and compounds
  - b. Organic compounds
  - c. State of fuel
  
- III. The nature and behavior of fire

- a. Basic Combustion
  - b. Flaming fire
  - c. Glowing fire
  - d. Explosive combustion
  - e. Heat
  - f. Sequence of a room fire
  - g. Effects of environmental conditions
- IV. Combustion properties of liquid and gaseous fuels
- a. Types of fuel
  - b. Physical properties of fuels
  - c. Hydrocarbon fuels
  - d. Nonhydrocarbon liquid fuels
  - e. Pyrolysis and decomposition of liquids
  - f. Fuel gas sources
- V. Combustion properties of solid fuels
- a. Pyrolysis
  - b. Combustion properties of wood
  - c. Combustion properties of paper
  - d. Combustion properties of plastics
  - e. Combustion properties of paint
  - f. Combustion properties of metals
  - g. Combustion properties of coal
  - h. Fire behavior
- VI. Sources of ignition
- a. Primary ignitions
  - b. The role of services and appliances in starting fires
  - c. The role of hot and burning fragments in kindling fires
  - d. Smoking as a fire origin
  - e. The role of animals in igniting fires
  - f. Miscellaneous sources of ignition
- VII. Structure fires and their investigation
- a. Elements of building construction
  - b. General principles of fire behavior
  - c. Investigative information during suppression
  - d. Examination of a structure fire scene
  - e. Documenting the fire scene
  - f. Conclusions about the fire
- VIII. Grass and Wildland fires and their investigation
- a. Fuels
  - b. Fire behavior
  - c. Determination of origin
  - d. Sources of ignition

- e. Collection and preservation of evidence
  
- IX. Automobile, motor vehicle, and ship fires
  - a. Automobile and motor vehicles
  - b. Boats and ships
  
- X. Electrical causes of fire
  - a. Basic electricity
  - b. Wiring systems
  - c. Ignition by electrical means
  - d. Investigation of electrical-related fires
  
- XI. Clothing and fabric fires
  - a. Types of cloth
  - b. Fire hazards
  - c. Regulations on flammable fabrics
  - d. Flammability of mattresses and upholstered furniture
  - e. Flammability Testing
  
- XII. Explosions and explosive combustion
  - a. Explosive combustion
  - b. Diffuse-phase explosions
  - c. Dense-phase explosions
  - d. Investigation of explosions
  
- XIII. Chemical fires and hazardous materials
  - a. Gases
  - b. Liquids
  - c. Solids
  - d. Clandestine Drug Laboratories
  
- XIV. Laboratory services
  - a. General fire evidence
  - b. Identification of volatile accelerants
  - c. Chemical incendiaries
  - d. Non-fire-related criminal evidence
  
- XV. Fire-related deaths and injuries
  - a. Pathological and toxicological examination
  - b. Destruction of the body
  - c. Carbon monoxide asphyxiation
  
- XVI. Arson as a crime
  - a. The crime of arson
  - b. Motive

- c. The arson set
- d. Deductions from the interpretation of evidence

XVII. Other investigative topics

- a. Safety
- b. Fire modeling
- c. Arson
- d. Elements of proof
- e. Sources of information
- f. Chain of evidence
- g. Report writing
- h. Courtroom testimony

**REQUIRED TEXTBOOKS AND MATERIALS:**

Textbooks to be selected by instructor.

**STATEMENT FOR STUDENTS WITH DISABILITIES:**

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.