

National Fire Academy FESHE Model Curriculum Associate's (Core)

Reviewed May 2019



TABLE OF CONTENTS

Principles of Emergency Services (C0273)	3
Building Construction for Fire Protection (C0275)	7
Fire Behavior and Combustion (C0276).....	12
Principles of Fire and Emergency Services Safety & Survival (C0281).....	17
Fire Prevention (C0286)	21
Fire Protection Systems (C0288).....	25

Principles of Emergency Services (C0273)

Course Description

This course provides an overview to fire protection and emergency services; career opportunities in fire protection and related fields; culture and history of emergency services; fire loss analysis; organization and function of public and private fire protection services; fire departments as part of local government; laws and regulations affecting the fire service; fire service nomenclature; specific fire protection functions; basic fire chemistry and physics; introduction to fire protection systems; introduction to fire strategy and tactics; life safety initiatives.

Prerequisites

None

Course Outcomes

Upon completion of this course, you will be able to:

1. Illustrate the history of the fire service.
 - a. Illustrate and explain the history.
 - b. Evaluate the culture of the fire service.
 - c. Analyze the basic components of fire as a chemical chain reaction, as well as the major phases of fire.
 - d. Examine the main factors that influence fire spread and fire behavior.
2. Compare and contrast the components and development of the fire and emergency services.
 - a. List and describe the major organizations that provide emergency response service, and illustrate how they interrelate.
 - b. Explain the scope, purpose, and organizational structure of fire and emergency services.
 - c. Differentiate between fire service training and education.
 - d. Explain the value of higher education to the professionalization of the fire service.

- e. Define the role of national, State, and local support organizations in fire and emergency services.
 - f. Describe the common types of fire and emergency service facilities, equipment, and apparatus.
 - g. Compare and contrast effective management concepts for various emergency situations.
3. Analyze careers in fire and emergency services.
- a. Identify fire protection and emergency-service careers in both the public and private sector.
 - b. Explain the primary responsibilities of fire prevention personnel, including code enforcement, public information, and public and private protection systems.
 - c. Develop the components of career preparation and goal setting.
 - d. Demonstrate the importance of wellness and fitness as it relates to emergency services.

Available Texts

Klinoff, R. (2015). *Introduction to fire and emergency services* (5th ed.). Burlington, MA: Jones & Barlett Learning. ISBN: 9781284136128. <https://www.psglearning.com/catalog/productdetails/9781284136128>

Loyd, J., & Richardson, J. (2013). *Fundamentals of fire and emergency services* (2nd ed.). New York, NY: Pearson. ISBN-10: 0-13341923-1, ISBN-13: 978-0-13-341923-8. <http://www.bradybooks.com/store/product.aspx?isbn=0133419231>

Supporting References/Research for Faculty and Students

Cote, A. E. (Ed.). (2008). *Fire protection handbook, volumes I and II* (20th ed.). National Fire Protection Association. <https://www.constructionbook.com/store/product/fire-protection-handbook-20th-edition>

IFSTA. (2015). *Fire and emergency services orientation and terminology* (6th ed.). Stillwater, OK: Fire Protection Publications. ISBN: 978-0-87939-592-6. <https://www.ifsta.org/shop/fire-and-emergency-services-orientation-and-terminology-6th-edition/36490>

U.S. Fire Administration (USFA) Publications: <http://www.usfa.fema.gov/applications/publications> (See Arson, Fire Data, Fire Protection, Fire Service Operations, Hazardous materials, Health and Safety, Wildfires).

Applied Research: Agency Research: <http://www.usfa.fema.gov>

Research Reports: <http://www.usfa.fema.gov>

Technical Reports: <http://www.usfa.fema.gov/applications/publications>

Topical Fire Research Series: <http://www.usfa.fema.gov/research>

Learning Resource Center: <http://www.lrc.fema.gov>

National Institute for Standards and Technology (NIST): <http://www.fire.nist.gov> (see Publications, FIREDOC (under Publications)).

Lessons Learned Information Sharing:

- <http://www.llis.dhs.gov/member/secure/index.cfm>
- <http://www.usfa.fema.gov/applications/publications/techreps.cfm>

Additional References

FEMA - Emergency Management Institute (EMI) Course | IS-200.C: Basic Incident Command System for Initial Response. (2019). Training.fema.gov. Retrieved 19 January 2017, from <https://training.fema.gov/is/courseoverview.aspx?code=IS-200.c>

FEMA - Emergency Management Institute (EMI) Course | IS-100.C: Introduction to the Incident Command System, ICS100. (2019). Training.fema.gov. Retrieved 19 January 2017, from <https://training.fema.gov/is/courseoverview.aspx?code=IS-100.c>

FEMA - Emergency Management Institute (EMI) Course | IS-700.B: An Introduction to the National Incident Management System. (2018). Training.fema.gov. Retrieved 19 January 2017, from <https://training.fema.gov/is/courseoverview.aspx?code=IS-700.b>

IFSTA. (2011). *Fire and emergency services orientation and terminology* (5th ed.). Stillwater, OK: Fire Protection Publications.

SMOKE your firefighter interview, (2003). P. Lepore, 1st Ed. San Juan Capistrano, CA: Freespool Publications.

Strategic and tactical considerations on the fireground, (2002). J. Smith, P. Newton & J. Smith, 1st ed. Victori, B.C.: Trafford.

Course Outline

- I. Careers in the Fire Protection/Emergency Services
 - A. Opportunities/Private, Industrial, Local, Municipal, State and Federal
 - B. Pay, Hours of Duty, Benefits, Promotion and Retirement Qualifications
 - C. Work Ethics and Human Relations Education and Training
 - 1. Certificates
 - 2. Degrees
 - 3. Selection Process

- II. History
 - A. Evolution of the Fire Protection
 - B. The U.S. Fire Problem: Life and Property

- III. Fire Prevention and Public Fire Education
 - A. Fire Investigation
 - B. Code Enforcement
 - C. Public Education

- IV. Scientific Terminology
 - A. Fire Behavior
 - B. Flammability and Characteristics of Solids, Liquids and Gases

- V. Building Design and Construction

- VI. Fire Detection and Suppression Systems

- VII. The Role of Public and Private Support Organizations
 - A. Local
 - B. State
 - C. Federal and National
 - D. International

- VIII. Fire and Emergency Services Equipment and Facilities Management
 - A. Emergency Operations
 - B. Organizational Structure of Fire and Emergency Services

Building Construction for Fire Protection (C0275)

Course Description

This course provides the components of building construction related to firefighter and life safety. The elements of construction and design of structures are shown to be key factors when inspecting buildings, preplanning fire operations, and operating at emergencies.

Prerequisites

Completion of Principles of Emergency Services (C0273) or instructor approval.

Course Outcomes

Upon completion of this course, you will be able to:

1. Describe building construction as it relates to firefighter safety, buildings codes, fire prevention, code inspection, firefighting strategy, and tactics.
2. Classify major types of building construction in accordance with a local/model building code.
3. Analyze the hazards and tactical considerations associated with the various types of building construction.
4. Explain the different loads and stresses that are placed on a building and their interrelationships.
5. Identify the function of each principle structural component in typical building design.
6. Differentiate between fire resistance, flame spread, and describe the testing procedures used to establish ratings for each.
7. Classify occupancy designations of the building code.
8. Identify the indicators of potential structural failure as they relate to firefighter safety.
9. Identify the role of GIS as it relates to building construction.

Course Objectives

Upon completion of this course, you will be able to:

1. Identify various classifications of building construction.
2. Understand theoretical concepts of how fire impacts major types of building construction.

Available Texts

Corbett, G. P., & Brannigan, F. L. (2016). *Brannigan's building construction for the fire service* (5th ed.). Burlington, MA: Jones & Bartlett Learning. Enhanced ISBN: 9781284136135. <https://www.psglearning.com/fire/science/productdetails/9781284136135>

IFSTA. (2016). *Building construction related to the fire service* (4th ed.). Stillwater, OK: Fire Protection Publications. ISBN: 978-0-87939-5940, https://www.ifsta.org/shop/search?search_block_form=building+construction+related+to+the+fire+service%2C+4th

Schwinge, C. (2017). *Knowing your buildings: A firefighter's reference guide* (2nd ed.). Tulsa, OK: PennWell Books. ISBN: 9781593703257, <http://www.PennWellbooks.com/shop-fire-books-videos/new-products/knowning-your-buildings-a-firefighters-reference-guide-2nd-edition/>

Smith, M. (2012). *Building construction methods and materials for the fire service* (2nd ed.). New York, NY: Pearson. ISBN-10: 0-13-283007-8; ISBN-13: 978-0-13-283007-2. <http://www.bradybooks.com/store/product.aspx?isbn=0132830078>

Supporting References/Research for Faculty and Students:

Smith, J., & Newton, P. (2002). *Strategic and tactical considerations on the fireground* (1st ed.). Victoria, British Columbia: Trafford.

Society of Fire Protection Engineers: <http://www.sfpe.org/>

U.S. Fire Administration (USFA) Publications: <http://www.usfa.fema.gov/applications/publications> (See Arson, Fire Data, Fire Protection, Fire Service Operations, Hazardous materials, Health and Safety, Wildfires).

Applied Research: Agency Research: <http://www.usfa.fema.gov>

Research Reports: <http://www.usfa.fema.gov>

Technical Reports: <http://www.usfa.fema.gov/applications/publications>

Topical Fire Research Series: <http://www.usfa.fema.gov/research>

Learning Resource Center: <http://www.lrc.fema.gov>

National Institute for Standards and Technology (NIST): <http://www.fire.nist.gov> (see Publications, FIREDOC (under Publications)).

Lessons Learned Information Sharing:

- <http://www.fire.nationalnearmiss.org/>

Assessment

Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.

Course Outline

- I. Introduction
 - A. History of Building Construction
 - B. Governmental Functions, Building and Fire Codes
 - C. Fire Risks and Fire Protection
 - D. Fire Loss Management and Life Safety
 - E. Pre-fire Planning and Fire Suppression Strategies

- II. Principles of Construction
 - A. Terminology and Definitions
 - B. Building and Occupancy Classifications
 - C. Characteristics of Building Materials
 - D. Types and Characteristics of Fire Loads
 - E. Effects of Energy Conservation

- III. Building Construction
 - A. Structural Members
 1. Definitions, Descriptions and Carrying Capacities
 2. Effects of Loads
 - B. Structural Design and Construction Methods
 - C. System Failures

- IV. Principles of Fire Resistance
 - A. Standards of Construction
 - B. Fire Intensity and Duration
 - C. Theory versus Reality

- V. Fire Behavior versus Building Construction
 - A. Flame Spread
 - B. Smoke and Fire Containment
 - 1. Construction and Suppression Systems
 - 2. HVAC Systems
 - 3. Rack Storage
 - 4. Combustible

- VI. Wood Construction
 - A. Definition and Elements of Construction
 - B. Types of Construction
 - C. Fire Stopping and Fire Retardants
 - D. Modifications/Code Compliance

- VII. Ordinary Construction
 - A. Definitions and Elements of Construction
 - B. Structural Stability and Fire Barriers
 - C. Modifications/Code Compliance

- VIII. Collapse

- IX. Ventilation

- X. Non-Combustible

- XI. Steel Construction
 - A. Definitions and Elements of Construction
 - B. Structural Stability, Fire Resistance and Fire Protection of Elements
 - C. Modifications/Code Compliance

- XII. Concrete Construction
 - A. Definitions and Elements of Construction
 - B. Structural Stability and Fire Resistance
 - C. Modifications/Code Compliance

- XIII. High Rise Construction
 - A. Early versus Modern Construction
 - B. Vertical and Horizontal Extension of Fire and Smoke
 - C. Fire Protection and Suppression
 - D. Elevators

- E. Atriums/Lobbies
- F. Modifications/Code Compliance

XIV. Collapse

XV. Ventilation

Fire Behavior and Combustion (C0276)

Course Description

This course explores the theories and fundamentals of how and why fires start, spread, and are controlled.

Prerequisites

None.

Course Outcomes

Upon completion of this course, you 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. Explain the effect and dangers of air movement on the combustion process.
7. Discuss various materials and their relationship to fires as fuel.
8. Demonstrate knowledge of the characteristics of water as a fire suppression agent.
9. Articulate other suppression agents and strategies.
10. Compare other methods and techniques of fire extinguishments.

Course Objectives

Upon completion of this course, you will be able to:

1. Identify the fundamental theories of fire behavior and combustion.
2. Differentiate the various types of extinguishing agents.

Available Texts

- Cote, A. E. (Ed.). (2008). *Fire protection handbook, volumes I and II* (20th ed.). National Fire Protection Association. <http://catalog.nfpa.org/Fire-Protection-Handbook-20th-Edition-P13860.aspx>
- Friedman, R. (2015). *Principles of fire behavior and combustion* (4th ed.). Burlington, MA: Jones & Bartlett Learning. ISBN: 9781284136111. <https://www.psglearning.com/fire/science/productdetails/9781284136111>
- Gorbett, G., & Pharr, J. (2011). *Fire dynamics*. New York, NY: Pearson. ISBN-10: 0-13-507588-2, ISBN-13: 978-0-13-507588-3. <http://www.bradybooks.com/store/product.aspx?isbn=0135075882>
- Mahoney, E., Rickman, T., & Wallace, G. (2008). *Fire suppression practices and procedures* (2nd ed.). New York, NY: Pearson. <http://www.bradybooks.com/store/product.aspx?isbn=0131517732>
- Quintiere, J. G. (2008). *Principles of fire behavior* (2nd ed.). Clifton Park, NY: Delmar, Cengage Learning. ISBN-10: 0-13-151773-2; ISBN-13: 978-0-13-151773-8. <http://www.cengagebrain.com/shop/isbn/9780827377325>
- Shackelford, R. (2009). *Fire behavior and combustion processes*. Clifton Park, NY: Delmar, Cengage Learning. ISBN-10: 1-4018-8016-9; ISBN-13: 978-1-4018-8016-3. <http://www.cengagebrain.com/shop/isbn/9781401880163>

Supporting References/Research for Faculty and Students

U.S. Fire Administration (USFA) Publications: <http://www.usfa.fema.gov/applications/publications> (See Arson, Fire Data, Fire Protection, Fire Service Operations, Hazardous materials, Health and Safety, Wildfires).

Applied Research: Agency Research: <http://www.usfa.fema.gov>

Research Reports: <http://www.usfa.fema.gov>

Technical Reports: <http://www.usfa.fema.gov/applications/publications>

Topical Fire Research Series: <http://www.usfa.fema.gov/research>

Learning Resource Center: <http://www.lrc.fema.gov>

National Institute for Standards and Technology (NIST): <http://www.fire.nist.gov> (see Publications, FIREDOC (under Publications)).

Lessons Learned Information Sharing

- <http://www.fire.nationalnearmiss.org/>

References

Society of Fire Protection Engineers (SFPE): <http://www.pentoncmg.com/sfpe/index.html>

Current Events/News

<http://www.firehouse.com/>

<http://www.fireengineering.com/>

<http://www.withthecommand.com/>

Assessment

Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.

Course Outline

I. 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

II. Units of Measurements

- A. International (SI) Systems of Measurement
- B. English Units of Measurement

III. Chemical Reactions

- A. Physical States of Matter
- B. Compounds and Mixtures
- C. Solutions and Solvents
- D. Process of Reactions

- IV. Fire and the Physical World
 - A. Characteristics of Fire
 - B. Characteristics of Solids
 - C. Characteristics of Liquids
 - D. Characteristics of Gases

- V. Heat and its Effects
 - A. Production and Measurement of Heat
 - B. Different Kinds of Heat

- VI. Properties of Solid Materials
 - A. Common Combustible Solids
 - B. Plastic and Polymers
 - C. Combustible Metals
 - D. Combustible Dust

- VII. Common Flammable Liquids and Gases
 - A. General Properties of Gases
 - B. The Gas Laws
 - C. Classification of Gases
 - D. Compressed Gases

- VIII. Fire Behavior
 - A. Stages of Fire
 - B. Fire Phenomena
 - 1. Flashover
 - 2. Backdraft
 - 3. Rollover
 - 4. Flameover
 - 5. Heat Flow
 - C. Fire Plumes

- IX. Fire Extinguishment
 - A. The Combustion Process
 - B. The Character of Flame
 - C. Fire Extinguishment

X. 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

XI. 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

Principles of Fire and Emergency Services Safety & Survival (C0281)

Course Description

This course introduces the basic principles and history related to the national firefighter life safety initiatives, focusing on the need for cultural and behavior change throughout the emergency services.

Prerequisites

None.

Course Outcomes

Upon completion of this course, you will be able to:

1. Define and describe the need for cultural and behavioral change within the emergency services relating to safety, incorporating leadership, supervision, accountability, and personal responsibility.
2. Explain the need for enhancements of personal and organizational accountability for health and safety.
3. Define how the concepts of risk management affect strategic and tactical decision-making.
4. Describe and evaluate circumstances that might constitute an unsafe act.
5. Explain the concept of empowering all emergency services personnel to stop unsafe acts.
6. Validate the need for national training standards as they correlate to professional development inclusive of qualifications, certifications, and re-certifications.
7. Defend the need for annual medical evaluations and the establishment of physical fitness criteria for emergency services personnel throughout their careers.
8. Explain the vital role of local departments in national research and data collection systems.
9. Illustrate how technological advancements can produce higher levels of emergency services safety and survival.
10. Explain the importance of investigating all near-misses, injuries, and fatalities.

11. Discuss how incorporating the lessons learned from investigations can support cultural change throughout the emergency services.
12. Describe how obtaining grants can support safety and survival initiatives.
13. Formulate an awareness of how adopting standardized policies for responding to emergency scenes can minimize near-misses, injuries, and deaths.
14. Explain how the increase in violent incidents impacts safety for emergency services personnel when responding to emergency scenes.
15. Recognize the need for counseling and psychological support for emergency services personnel and their families, and identify access to local resources and services.
16. Describe the importance of public education as a critical component of life safety programs.
17. Discuss the importance of fire sprinklers and code enforcement.
18. Explain the importance of safety in the design of apparatus and equipment.

Course Objectives

Upon completion of this course, you will be able to:

1. Identify and explain the 16 life safety initiatives.
2. Understand the concepts of risk management and mitigation as it pertains to emergency services.

Available Texts

Angle, J. S. (2016). *Occupational safety and health in emergency services* (4th ed.). Burlington, MA: Jones & Bartlett Learning. ISBN: 9781284035919. <https://www.psglearning.com/catalog/productdetails/9781284035919>

Everyone Goes Home. (n.d.). *16 firefighter life safety initiatives*. Retrieved from <https://www.everyonegoeshome.com/16-initiatives/>

Ford, T. (2012). *Fire and emergency services safety and survival*. New York, NY: Pearson. ISBN-10: 0-13-283004-3; ISBN-13: 978-0-13-283004-1. <http://www.bradybooks.com/store/product.aspx?isbn=0132830043>

IFSTA. (2010). *Understanding and implementing the 16 firefighter life safety initiatives*. Stillwater, OK: Fire Protection Publications. https://shop.ifsta.org/product_info.php/products_id/70441

Supporting References/Research for Faculty and Students:

Firefighter Life Safety Summit Initial Report and additional summit reports (Wildland Firefighting, Health—Wellness—Fitness, Structural Firefighting, Emergency Vehicles and Roadway Safety, Culture Change) at www.everyonegoeshome.com

IFSTA. (2010). *Understanding and implementing the 16 firefighter life safety initiatives*. Stillwater, OK: Fire Protection Publications. https://shop.ifsta.org/product_info.php/products_id/70441

Assessment

Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.

Course Outline

- I. Introduction
 - A. History of Fire Service Culture
 - B. Organizational Culture
 - C. Individual Role in Culture/Behavior
 - D. History of Line of Duty Deaths and Injuries Statistics
 - E. Defining the Nature of the Problem

- II. The National Context, Health and Safety
 - A. NFPA, OSHA
 - B. Medical and Fitness Standards
 - C. Data Collection (NFIRS)
 - D. Research/Investigation (NIST, NIOSH)

- III. Training, Equipment, Response
 - A. Training, Certification, Credentialing
 - B. Apparatus and Equipment
 - C. Emergency Response – Response to Emergency Scenes
 - D. Violent Incidents
 - E. Emerging Technologies

- IV. Organizational Health and Safety Profile
 - A. Personal and Organizational Accountability
 - B. Present Condition/Culture
 - C. Investigations - Internal
 - D. Analyzing your Profile
 - E. Utilizing Grants to Meet Needs

- V. Risk Management
 - A. Risk Management Concepts and Practices
 - B. Unsafe Acts
 - C. Empowerment Definition

- VI. Prevention
 - A. Home Fire Sprinklers
 - B. Code Enforcement
 - C. Public Education/Fire and Life Safety
 - D. Counseling and Psychological Support

Fire Prevention (C0286)

Course Description

This course provides fundamental knowledge relating to the field of fire prevention. Topics include: history and philosophy of fire prevention; organization and operation of a fire prevention bureau; use and application of codes and standards; plans review; fire inspections; fire and life safety education; and fire investigation.

Prerequisites

None.

Course Outcomes

Upon completion of this course, you will be able to:

1. Define the national fire problem and role of fire prevention.
2. Identify and describe fire prevention organizations and associations.
3. Define laws, rules, regulations, and codes, and identify those relevant to fire prevention of the authority having jurisdiction.
4. Define the functions of a fire prevention bureau.
5. Describe inspection practices and procedures.
6. Identify and describe the standards for professional qualifications for Fire Marshal, Plans Examiner, Fire Inspector, Fire and Life Safety Educator, and Fire Investigator.
7. List opportunities in professional development for fire prevention personnel.
8. Describe the history and philosophy of fire prevention.

Course Objectives

Upon completion of this course, you will be able to:

1. Identify laws, codes, ordinances, and regulations as they relate to fire prevention.
2. Understand code enforcement as it impacts life and property loss.

Available Texts

- Cote, A. E. (Ed.). (2008). *Fire protection handbook, volumes I and II* (20th ed.). National Fire Protection Association. <https://www.constructionbook.com/store/product/fire-protection-handbook-20th-edition>
- Diamantes, D. (2016). *Principles of fire prevention* (3rd ed.). Burlington, MA: Jones & Bartlett Learning. ISBN: 9781284041866. <https://www.psglearning.com/catalog/productdetails/9781284041866>
- Harrington, G. E., & Bidga, K. (2018). *NFPA 101: Life safety code handbook*. National Fire Protection Association. <https://catalog.nfpa.org/NFPA-101-Life-Safety-Code-Handbook-P15695.aspx>
- IFSTA. (2016). *Fire inspection and code enforcement* (8th ed.). Stillwater, OK: Fire Protection Publications. ISBN: 978-0-87939-605-3. <https://www.ifsta.org/shop/fire-inspection-and-code-enforcement-8th-edition/36299>
- Robertson, J. C. (2015). *Introduction to fire prevention* (8th ed.). New York, NY: Pearson. ISBN-10: 0-13-384327-0; ISBN-13: 978-0-13-384327-9. <http://www.bradybooks.com/store/product.aspx?isbn=0133843270>
- Valentine, P., & Lacey, B. (2017). *Fire prevention applications* (2nd ed.). Stillwater, OK: Fire Protection Publications. ISBN: 9780879396213, <https://www.ifsta.org/shop/fire-prevention-applications-2nd-edition/36200>

Supporting References/Research for Faculty and Students

U.S. Fire Administration (USFA) Publications: <http://www.usfa.fema.gov/applications/publications> (See Arson, Fire Data, Fire Protection, Fire Service Operations, Hazardous materials, Health and Safety, Wildfires).

Applied Research: Agency Research: <http://www.usfa.fema.gov>

Research Reports: <http://www.usfa.fema.gov>

Technical Reports: <http://www.usfa.fema.gov/applications/publications>

Topical Fire Research Series: <http://www.usfa.fema.gov/research>

Learning Resource Center: <http://www.lrc.fema.gov>

National Institute for Standards and Technology (NIST): <http://www.fire.nist.gov> (see Publications, FIREDOC (under Publications)).

Lessons Learned Information Sharing

- <http://www.llis.dhs.gov/member/secure/index.cfm>
- <http://www.usfa.fema.gov/applications/publications/techreps.cfm>

Assessment

Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.

Course Outline

- I. National Fire Problem and Role of Fire Prevention
 - A. Definition
 - B. Historical Overview
 - C. Data Analysis/GIS
 - D. Current Trends of Fire Prevention
- II. Fire Prevention Organizations and Associations
 - A. Public--Federal, State and Local
 - B. Private--International, National and Regional
- III. Laws, Rules, Regulations and Codes
 - A. Definitions
 - B. Applicability
 - C. Interrelationship
 - D. Limitations
- IV. Fire Prevention Bureau Functions
 - A. Data Collection and Analysis
 - B. Plans Review
 - C. Fire Inspections
 - D. Fire and Life Safety Education
 - E. Fire Investigations
- V. Tools and Equipment
 - A. Data Collection and Analysis
 - B. Plans Review
 - C. Fire Inspections

- D. Fire and Life Safety Education
 - E. Fire Investigations
- VI. Roles and Responsibilities of Fire Prevention Personnel
- A. Data Collection and Analysis
 - B. Code Development and Interpretation
 - C. Training and Education
 - D. Enforcement
 - E. Management
- VII. Professional Certification
- A. Categories and Levels
 - B. Local
 - C. State
 - D. National
- VIII. Professional Development
- A. National Fire Prevention Development Model
 - B. Training and Education
 - C. Certification Systems

Fire Protection Systems (C0288)

Course Description

This course provides information relating to the features of design and operation of fire alarm systems, water-based fire suppression systems, special hazard fire suppression systems, water supply for fire protection and portable fire extinguishers.

Prerequisites

None

Course Outcomes

Upon completion of this course, you will be able to:

1. Identify the different types, uses, and benefits of fire protection systems found in various types of structures.
2. Summarize the basic elements of a public water supply system as it relates to fire protection systems.
3. Explain the operation and appropriate application for the different types of portable fire protection systems.
4. Identify the different types and components of sprinkler, standpipe, and foam systems.
5. Discuss residential and commercial sprinkler legislation.
6. Compare the basic components and detectors in a fire alarm system.
7. Describe the hazards of smoke, and list the four factors that can influence smoke movement in a building.

Course Objectives

Upon completion of this course, you will be able to:

1. Identify and describe various types and uses of fire protection systems.
2. Describe the basic elements of a public water supply system as it relates to fire protection.

Available Texts

Cote, A. E. (Ed.). (2008). *Fire protection handbook, volumes I and II* (20th ed.). National Fire Protection Association. <https://www.constructionbook.com/store/product/fire-protection-handbook-20th-edition>

Jones, A. M., Jr. (2015). *Fire protection systems* (2nd ed.). Burlington, MA: Jones & Bartlett Learning. ISBN: 9781284294170. <https://www.psglearning.com/catalog/productdetails/9781284294170>

IFSTA. (2016). *Fire protection, detection, and suppression systems* (5th ed.). Stillwater, OK: Fire Protection Publications. ISBN: 978-0-87939-599-5. <https://www.ifsta.org/shop/fire-protection-detection-and-suppression-systems-5th-edition/36536>

National Training Center. (2009). *NTC brown book: Fire alarm system handbook 2018*. National Training Center. <https://www.amazon.com/NTC-BROWN-Brown-Systems-Design-Installation/dp/0976951142>

NFPA. (2003). *Operation of fire protection systems: A special edition of the Fire Protection Handbook*. National Fire Protection Association. ISBN-10: 0877655847; ISBN-13: 9780877655848. <https://www.amazon.com/Operation-Fire-Protection-Systems-NULL/dp/0877655847>

Supporting References/Research for Faculty and Students

Bryan, J. L. (March 1993). *Fire suppression and detection systems* (3rd ed.). London: MacMillan Publishing.

Gagnon, R. (1997). *Design of water-based fire protection systems*. Clifton Park, NY: Delmar, Cengage Learning.

Smith, C. M., Weider, M., Brakhage, C., & IFSTA. (2001). *Private fire protection and detection* (2nd ed.). International Fire Service Training Association.

Society of Fire Protection Engineers: <http://www.sfpe.org/>

U.S. Fire Administration (USFA) Publications: <http://www.usfa.fema.gov/applications/publications> (See Arson, Fire Data, Fire Protection, Fire Service Operations, Hazardous materials, Health and Safety, Wildfires).

Applied Research: Agency Research: <http://www.usfa.fema.gov>

Research Reports: <http://www.usfa.fema.gov>

Technical Reports: <http://www.usfa.fema.gov/applications/publications>

Topical Fire Research Series: <http://www.usfa.fema.gov/research>

Learning Resource Center: <http://www.lrc.fema.gov>

National Institute for Standards and Technology (NIST): <http://www.fire.nist.gov> (see Publications, FIREDOC (under Publications)).

Lessons Learned Information Sharing

- <http://www.llis.dhs.gov/member/secure/index.cfm>
- <http://www.usfa.fema.gov/applications/publications/techreps.cfm>
- <http://www.homefiresprinkler.org>

Assessment

Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.

Course Outline

- I. Introduction to Fire Protection Systems
 - A. The Role Fire Protection Systems Play in Protecting the Life, Safety, and Welfare of the General Public and Firefighters
 - B. Overview of the Different Types of Fire Protection Systems
 - C. The Role of Codes & Standards in Fire Protection System Design
- II. Water Supply Systems for Fire Protection Systems
 - A. Sources of Fire Protection Water Supply
 - B. Distribution Networks
 - C. Piping
 - D. Hydrants
 - E. Utility Company Interface with the Fire Department
- III. Water-Based Fire Suppression Systems
 - A. Properties of Water
 1. Water as an Effective Extinguishing Agent
 2. How Water Extinguishes Fire
 - B. Sprinkler Systems
 1. Types of Systems & Applications
 2. Types of Sprinklers & Applications
 3. Piping, Valves, Hangers & Alarm Devices
 4. Fire Department Operations in Buildings with Sprinkler Systems
 - C. Residential Sprinkler Systems

- D. Standpipe Systems
 - 1. Types & Applications
 - 2. Fire Department Operations in Buildings with Standpipes
 - E. Foam Systems
 - F. Water Mist Systems
 - G. Fire Pumps
 - 1. Types
 - 2. Components
 - 3. Operation
 - 4. Fire Pump Curves
- IV. Non-Water-Based Fire Suppression Systems
- A. Carbon Dioxide Systems
 - 1. Applications
 - 2. Extinguishing Properties
 - 3. System Components
 - B. Halogenated Systems
 - 1. Halon 1301 and the Environment
 - 2. Halon Alternatives
 - 3. Extinguishing Properties
 - 4. System Components
 - C. Dry/Wet Chemical Extinguishing Systems
 - 1. Extinguishing Properties
 - 2. Applications
 - 3. UL 300
- V. Fire Alarm Systems
- A. Components
 - B. Types of Fire Alarm Systems
 - C. Detectors
 - 1. Smoke
 - 2. Heat
 - 3. Flame
 - D. Audible/Visual Devices
 - E. Alarm Monitoring
 - F. Testing & Maintenance of Fire Alarm Systems
- VI. Smoke Management Systems
- A. Hazards of Smoke
 - B. Smoke Movement in Buildings
 - C. Types of Smoke Management Systems
 - D. Firefighter Operations in Buildings with Smoke Management Systems

VII. Portable Fire Extinguishers

- A. Types & Applications
- B. Selection
- C. Placement
- D. Maintenance
- E. Portable Fire Extinguisher Operations