

STRANDS AND STANDARDS

FIRE SCIENCE, INTRODUCTION



Course Description

Explores career opportunities and job requirements of fire and rescue emergency services. Discusses the various duties within emergency services, including structural fire fighting, wildland fire fighting, technical rescue, hazardous materials control, fire protection, fire investigations, and incident command. Explains the employment testing and selection processes of federal, state, municipal, and industrial emergency service organizations. Provides information, skills, and facilities to help students develop personal fitness plans in preparation for fire service physical ability testing.

Intended Grade Level	11-12
Units of Credit	0.5
Core Code	40.06.00.00.010
Concurrent Enrollment Core Code	40.06.00.13.010
Prerequisite	None
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	CTE and/or Secondary
	Education 6-12
Required Endorsement(s)	
Endorsement 1	Fire Science
Endorsement 2	
Endorsement 3	

Strand 1

Students will explore early traditions and history of emergency services.

Standard 1

Discuss fire protection in early America.

Standard 2

Describe early American fire equipment.

Standard 3

Explain how the growth of the volunteer fire service affects modern-day fire and emergency services.

Standard 4

Describe how the “age of steam” affects modern-day fire and emergency services.

Standard 5

Describe how improvements to protective clothing and self-contained breathing apparatus (SCBA) impact modern-day fire practices.

Standard 6

Indicate how developments in gasoline- and diesel-powered equipment has changed modern-day fire practices.

Standard 7

Explain how the modern-day philosophy of public safety has been informed by historic fires in North America.

Standard 8

Explain how the modern-day philosophy of firefighter safety has been informed by historic fires in North America.

Performance Skill

Submit a case study relevant to early traditions in history of emergency services.

Strand 2

Students will explore career opportunities in emergency services.

Standard 1

Discuss the fire and emergency services culture.

Standard 2

Identify fire protection and emergency-service careers.

- Federal
- Local
- Private

Standard 3

Recognize the components of career preparation and goal setting.

Standard 4

Discuss how firefighters hold a position of public trust.

Standard 5

Differentiate between the following type of training:

- Fire service training and education
- Fire protection certificate programs
- Fire service degree programs

Standard 6

Compare and contrast the career firefighter selection process and the volunteer firefighter selection process.

Performance Skill

Submit a case study relevant to career opportunities in emergency services.

Strand 3

Students will explore firefighter physical fitness requirements.

Standard 1

Explore methods of assessing a candidate's current level of physical fitness.

Standard 2

Determine goals for a candidate's physical fitness improvement.

Standard 3

Locate and implement the weekly use of a Fitness Tracker.

Performance Skills

Take a pre-assessment to determine your/candidate's current level of physical fitness.

Verify that you have selected a fitness tracker and have started logging in it.

Strand 4

Students will explore roles of fire and emergency services personnel.

Standard 1

Identify the duties of fire suppression (operations) personnel.

- Engine
- Ladder
- Rescue companies
- Wildland

Standard 2

Define the roles of training division personnel.

- Chief officer
- Training captain
- Training specialist

Standard 3

Recognize possible positions for fire service administration.

- Fire chief
- Deputy chief
- Assistant chief

- Public information officer
- Fire marshal

Standard 4

Define special operations personnel duties.

- Technical rescue
- Hazardous Materials (HazMat)
- Bomb and Arson
- Airport Rescue Fire Fighting (ARFF)
- Swift Water

Standard 5

Explain how fire prevention (community risk reduction) personnel assist in enhancing community fire safety.

Standard 6

Compare and contrast the duties of emergency medical services personnel versus the duties of fire suppression personnel.

Standard 7

Describe the role emergency management personnel has in community safety planning.

Standard 8

Recognize other fire department personnel who assist in carrying out the broad mission of the fire department.

- Dispatch
- Information technology
- Apparatus maintenance
- Logistics

Performance Skill

Submit a case study relevant to roles of fire and emergency services personnel.

Strand 5

Students will explore roles of public and private support organizations.

Standard 1

Discuss local organizations that support fire and emergency services.

- Building departments
- Water departments
- Other utility departments

Standard 2

Describe state government agencies and organizations that support fire and emergency services.

- State Fire Marshal
- State Fire Training
- Law Enforcement
- Department of Public Safety (DPS)

Standard 3

Recognize the various federal agencies that support fire and emergency services in North America.

- Department of Homeland Security/FEMA
- Bureau of Alcohol, Tobacco, and Firearms (BATF)
- Bureau of Land Management
- Environmental Protection Association (EPA)

Standard 4

Identify trade, professional, and membership organizations in the United States and Canada.

- Factory Mutual (FM)
- Insurance Services Office (ISO)
- International Association of Fire Fighters (IAFF)
- International Association of Fire Chiefs (IAFC)

Strand 6

Students will explore fire prevention, life safety education, and fire investigation.

Standard 1

Identify the components of fire prevention.

- Fire inspections
- Fire investigation
- Fire and Life Safety education

Standard 2

Explain the various responsibilities of fire and emergency services personnel regarding fire prevention.

- Fire inspectors
- Arson investigators
- Public outreach/information

Performance Skill

Submit a case study relevant to fire prevention, life safety education and fire investigation.

Strand 7

Students will explore scientific terminology.

Standard 1

Describe the properties of matter.

- Solid
- Liquid
- Gas

Standard 2

Explain combustion, the fire tetrahedron, and fire development.

Standard 3

Describe special considerations of fire that have particular implications for firefighter safety.

- Explosive capabilities/energy
- Heat
- Chemical reactions

Standard 4

Discuss the four aspects of fire extinguishment theory.

- Heat reduction
- Fuel separation
- Oxygen removal
- Interruption of the chemical chain reaction

Standard 5

Define the five main stages of fire.

- Incipient
- Growth
- Fully developed
- Flash over
- Decay

Performance Skill

Submit a case study relevant to Scientific terminology.

Strand 8

Students will explore building construction.

Standard 1

Distinguish the main differences between the five types of building construction.

- Type I: Fire resistive
- Type II: Noncombustible
- Type III: Ordinary
- Type IV: Heavy timber
- Type V: Wood frame

Standard 2

Explain how common building materials affect fire prevention and code enforcement.

Standard 3

Describe the firefighter hazards related to building construction.

- Collapse
- Inhalation hazards
- Fire loads

Performance Skill

Submit a case study relevant to building construction.

Strand 9

Students will explore fire detection, alarm, and suppression systems.

Standard 1

Discuss the reasons for installing fire detection, alarm, and suppression systems.

- Occupant safety
- Building protection
- Property preservation

Standard 2

Describe various types of alarm systems.

- Heat activated alarms
- Smoke alarms
- Flame alarms
- Gas alarms

Standard 3

Describe the impact of automatic sprinkler systems on fire prevention and safety.

Standard 4

Identify how various standpipe systems impact fire fighting operation.

Performance Skill

Submit a case study relevant to fire detection, alarm, and suppression systems.

Strand 10

Students will explore fire and emergency services apparatus, equipment, and facilities.

Standard 1

Identify fire department apparatus.

- Fire engines
- Heavy rescue
- HazMat
- Air and Light
- Ladder truck

Standard 2

Recognize the uses for uniforms and personal protective clothing.

Standard 3

Explain the three basic types of breathing apparatus.

- Pressure demand
- Positive pressure
- Supply to air-line

Standard 4

Describe how powered and non-powered tools and equipment can be used in the fire and emergency services.

- Powered tools
 - Generators
 - Hydraulic
 - Spreaders
 - Rams
 - Cutters
 - Battery powered
- Non-powered tools
 - Axe
 - Air bags
 - Halligan

Standard 5

Recognize ropes, webbing, related hardware, and harnesses as used in the fire and emergency services.

- Life safety rope
- Utility rope
- Webbing
- Hardware
 - Carabiners
 - Harnesses

Standard 6

Describe why ground ladders are key to fire suppression activities.

Standard 7

Explain the basic functions of fire hose, nozzles, and hose appliances and tools.

Standard 8

Recognize uses for various fire department facilities.

- Training towers
- Fire stations
- Dispatch centers
- Headquarters/administration

Performance Skills

Submit a case study relevant to fire and emergency services apparatus, equipment, and facilities.

Strand 11

Students will explore fire department organization and management.

Standard 1

Discriminate between a policy and procedure as used in the fire and emergency services.

Standard 2

Describe the basic principles of organization.

- Span of control
- Division of labor
- Unity of command
- Discipline

Standard 3

Identify basic positions in the local government structure that can affect fire and emergency services.

- Commission
- Mayor/council
- Fire districts

Standard 4

Explain the different types of fire departments.

- Career
- Volunteer
- Part-paid

- Paid on-call

Standard 5

Describe automatic aid and mutual aid.

Standard 6

Explain the different ways a fire department can be funded.

- Tax revenue
- Bonds
- Grants
- Fundraisers
- Special fees

Standard 7

List the common purposes of fire protection agencies.

- Life safety
- Incident stabilization
- Property preservation

Standard 8

Describe how the Incident Management System works in the fire and emergency services field.

Performance Skills

Submit a case study relevant to fire department organization and management or complete the FEMA ICS 100 course.

Strand 12

Students will explore firefighter fitness issues and personal improvement.

Standard 1

Research articles related to fitness issues, inside and outside of the fire service.

- Importance of fitness to stay safe
- Lifelong fitness plans

Standard 2

Evaluate fitness articles for relevancy to firefighting.

Performance Skill

Write a synopsis of how the information applies to firefighter fitness; cite the information correctly using APA format.

Strand 13

Students will explore firefighter physical fitness post assessment and goal reporting.

Standard 1

Reflect on areas of improvement in the candidate's physical fitness.

Standard 2

Evaluate and determine lifelong goals for maintaining physical fitness to qualify for careers in the fire service.

Performance Skills

Repeat the physical fitness test to compare your original fitness level to current fitness level.
Submit your fitness tracker log for the course.

Strand 14

Students will explore goal setting.

Standard 1

Evaluate how goal setting helps a candidate mentally and physically prepares for a job in the fire service.

Standard 2

Identify specific short-term and long-term goals related to overall wellbeing.

Performance Skill

Submit an electronic copy (in "Word" format) of a paper that addresses short-term and long-term goals.

Workplace Skills

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal Requirements/expectations