

# ***FIRE SCIENCE STANDARDS***



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*All Nevadans ready for success in the 21st century*

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*To improve student achievement and educator effectiveness by ensuring opportunities, facilitating learning, and promoting excellence*



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**BUSINESS AND INDUSTRY VALIDATION**

All CTE standards developed through the Nevada Department of Education are validated by business and industry through one or more of the following processes: (1) the standards are developed by a team consisting of business and industry representatives; or (2) a separate review panel was coordinated with industry experts to ensure the standards include the proper content; or (3) the adoption of nationally-recognized standards endorsed by business and industry.

The Fire Science standards were validated through the active participation by business and industry on the development team. The Fire Science standards were also validated with the adoption of the Nevada State Fire Marshal’s support firefighter requirements.

The Fire Science standards were validated with the adoption of the nationally recognized standards utilizing NFPA Standard 1001-2013 for Firefighter Professional Qualifications, NFPA Standard 1072-2017 for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications, and NFPA Standard 1051-2016 for Wildland Fire Fighter Professional Qualifications, which were approved by the Nevada State Fire Marshal’s Office.

**PROJECT COORDINATOR**

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**INTRODUCTION**

The standards in this document are designed to clearly state what the student should know and be able to do upon completion of an advanced high school Fire Science program. These standards are designed for a three-credit course sequence that prepares the student for a technical assessment directly aligned to the standards.

These exit-level standards are designed for the student to complete all standards through their completion of a program of study. These standards are intended to guide curriculum objectives for a program of study.

The standards are organized as follows:

**Content Standards** are general statements that identify major areas of knowledge, understanding, and the skills students are expected to learn in key subject and career areas by the end of the program.

**Performance Standards** follow each content standard. Performance standards identify the more specific components of each content standard and define the expected abilities of students within each content standard.

**Performance Indicators** are very specific criteria statements for determining whether a student meets the performance standard. Performance indicators may also be used as learning outcomes, which teachers can identify as they plan their program learning objectives.

The crosswalk and alignment section of the document shows where the performance indicators support the Nevada Academic Content Standards. Where correlation with an academic content standard exists, students in the Fire Science program perform learning activities that support, either directly or indirectly, achievement of the academic content standards that are listed.

All students are encouraged to participate in the career and technical student organization (CTSO) that relates to the Fire Science program. CTSOs are co-curricular national associations that directly enforce learning in the CTE classroom through curriculum resources, competitive events, and leadership development. CTSOs provide students the ability to apply academic and technical knowledge, develop communication and teamwork skills, and cultivate leadership skills to ensure college and career readiness.

The Employability Skills for Career Readiness identify the “soft skills” needed to be successful in all careers, and must be taught as an integrated component of all CTE course sequences. These standards are available in a separate document.

The **Standards Reference Code** is only used to identify or align performance indicators listed in the standards to daily lesson plans, curriculum documents, or national standards.

Program Name: Fire Science Standards Reference Code: **FIRE**

Example: FIRE.2.3.4

Standards	Content Standard	Performance Standard	Performance Indicator
Fire Science	2	3	4

**CONTENT STANDARD 1.0 : PRACTICE FIREFIGHTER SAFETY AND HEALTH**

**PERFORMANCE STANDARD 1.1 : DESCRIBE THE SCOPE OF DEPARTMENTAL ORGANIZATIONS**

- 1.1.1 Summarize the fire service history
- 1.1.2 Explain the interactions between the different organizations in the fire service
- 1.1.3 Describe the fire service mission and organization
- 1.1.4 Identify career tracks within the fire service
- 1.1.5 Complete the National Incident Management System (NIMS) Incident Command System (ICS) 100, 200, and 700
- 1.1.6 Participate in oral interview and resume development activity

**PERFORMANCE STANDARD 1.2 : INTERPRET WRITTEN AGENCY POLICIES AND PROCEDURES**

- 1.2.1 Review departmental policies and procedures
- 1.2.2 Discuss the effect of policies and procedures on a specific work situation
- 1.2.3 Create standard operating procedures for a department or agency

**PERFORMANCE STANDARD 1.3 : EXPLORE SAFETY AND HEALTH**

- 1.3.1 Apply personal safety
- 1.3.2 Compare annual firefighter injuries and fatalities
- 1.3.3 Identify safety standards related to fire services, such as National Fire Protection Association (NFPA) 1500 and Occupational Safety and Health Administration (OSHA)
- 1.3.4 Identify facility safety
- 1.3.5 Participate in safety training
- 1.3.6 Recognize employee physical and mental wellness (injury, critical incident stress management (CISM), post-traumatic stress disorder (PTSD))
- 1.3.7 Demonstrate apparatus safety

**CONTENT STANDARD 2.0 : UNDERSTAND THE SCIENCE OF FIRE BEHAVIOR****PERFORMANCE STANDARD 2.1 : APPLY CONCEPTS OF SCIENCE OF FIRE BEHAVIOR**

- 2.1.1 Describe the fire tetrahedron
- 2.1.2 Describe transmission of heat
- 2.1.3 Explain the phases of fire growth
- 2.1.4 Describe factors that affect fire development
- 2.1.5 Describe fire control theory
- 2.1.6 Describe products of combustion

**PERFORMANCE STANDARD 2.2 : EXAMINE CLASSIFICATION OF FIRES**

- 2.2.1 Distinguish types of fires (A, B, C, D, and K)

**CONTENT STANDARD 3.0 : IDENTIFY PERSONAL PROTECTIVE EQUIPMENT****PERFORMANCE STANDARD 3.1 : IMPLEMENT PERSONAL AND DEPARTMENTAL SAFETY REGULATIONS**

- 3.1.1 Select appropriate personal protective equipment (PPE)
- 3.1.2 Employ safety hierarchy and communication systems
- 3.1.3 Demonstrate the care of personal protective equipment
- 3.1.4 Identify the various types of PPE worn by firefighters
- 3.1.5 Describe the limitations of PPE worn by firefighters
- 3.1.6 Demonstrate the method for donning / doffing personal protective clothing

**PERFORMANCE STANDARD 3.2 : APPLY CONCEPTS OF RESPIRATORY PROTECTION**

- 3.2.1 Discuss the types of respiratory protection (open and closed circuit)
- 3.2.2 Identify the components of a self-contained breathing apparatus (SCBA)
- 3.2.3 Describe respiratory hazards and when an SCBA shall be “used” (immediately dangerous to life or health (IDLH))
- 3.2.4 Practice donning and doffing an SCBA
- 3.2.5 Explain principles of air management consistent with NFPA 1404
- 3.2.6 Demonstrate replacement of SCBA air cylinders
- 3.2.7 Describe emergency procedures and failures
- 3.2.8 Demonstrate the use of a SCBA through a restricted opening



**CONTENT STANDARD 4.0 : CLASSIFY BUILDING CONSTRUCTION AND COMPONENTS****PERFORMANCE STANDARD 4.1 : DESCRIBE CONSTRUCTION TERMINOLOGY**

- 4.1.1 Identify and utilize various terms related to building construction
- 4.1.2 Describe the main types of occupancy classifications

**PERFORMANCE STANDARD 4.2 : DESCRIBE CONSTRUCTION CLASSIFICATION**

- 4.2.1 Distinguish between Types I, II, III, IV, and V
- 4.2.2 Identify common building materials

**PERFORMANCE STANDARD 4.3 : IDENTIFY BUILDING COMPONENTS**

- 4.3.1 Describe the basic construction of building components

**PERFORMANCE STANDARD 4.4 : IDENTIFY BUILDING FIRE DETECTION AND SUPPRESSION SYSTEMS**

- 4.4.1 Define various detection systems
- 4.4.2 Define various suppression systems

**CONTENT STANDARD 5.0 : DESCRIBE THE CLASSIFICATIONS OF PORTABLE FIRE EXTINGUISHERS****PERFORMANCE STANDARD 5.1 : DESCRIBE THE CLASSIFICATIONS OF EXTINGUISHERS**

- 5.1.1 Define the classification and application of extinguishers – A, B, C, D, and K
- 5.1.2 Describe fire extinguisher rating systems
- 5.1.3 Demonstrate the use of a portable fire extinguisher utilizing the pull, aim, squeeze, and sweep (PASS) method of application
- 5.1.4 Explain how to inspect a portable fire extinguisher

**CONTENT STANDARD 6.0 : EXPLORE FIRE SERVICE EQUIPMENT****PERFORMANCE STANDARD 6.1 : IDENTIFY RESCUE EQUIPMENT**

- 6.1.1 Identify and demonstrate common fire service ropes and knots
- 6.1.2 Understand hoisting and rope rescue techniques
- 6.1.3 Identify extrication tools and equipment
- 6.1.4 Explore technical rescue
- 6.1.5 Identify various fire service tools (pulling, pushing, and cutting)

**PERFORMANCE STANDARD 6.2 : IDENTIFY GROUND LADDERS**

- 6.2.1 Identify parts of a ladder
- 6.2.2 Identify ladder types, construction, and proper maintenance
- 6.2.3 Demonstrate proper ladder carries and placement
- 6.2.4 Demonstrate ladder safety
- 6.2.5 Demonstrate how to secure an extension ladder

**PERFORMANCE STANDARD 6.3 : IDENTIFY FIRE HOSES**

- 6.3.1 Identify fire hose sizes
- 6.3.2 Demonstrate care and maintenance of fire hoses
- 6.3.3 Identify hose appliance and tools
- 6.3.4 Demonstrate the hose rolls (straight, donut, twin, and self-locking)
- 6.3.5 Demonstrate the types of hose loads
- 6.3.6 Demonstrate hose deployment / pulls

**PERFORMANCE STANDARD 6.4 : IDENTIFY FIRE STREAMS**

- 6.4.1 Describe the properties of water and foam
- 6.4.2 Describe the concept of friction loss
- 6.4.3 Demonstrate fire stream patterns and nozzles

**CONTENT STANDARD 7.0 : EXPLORE TACTICAL VENTILATION****PERFORMANCE STANDARD 7.1 : DEFINE TACTICAL VENTILATION**

- 7.1.1 Describe the reasons for tactical ventilation
- 7.1.2 Demonstrate vertical ventilation
- 7.1.3 Demonstrate horizontal ventilation
- 7.1.4 Demonstrate mechanical ventilation

**PERFORMANCE STANDARD 7.2 : IDENTIFY FORCIBLE ENTRY PRINCIPLES**

- 7.2.1 Identify the basic principles of forcible entry
- 7.2.2 Identify construction features
- 7.2.3 Describe the basic construction of locks
- 7.2.4 Demonstrate entry techniques (e.g., doors, windows, gates, walls, floors)

**CONTENT STANDARD 8.0 : CLASSIFY WATER SUPPLY****PERFORMANCE STANDARD 8.1 : DEFINE THE PRINCIPLES OF WATER SUPPLY SYSTEMS**

- 8.1.1 Describe sources of water supply
- 8.1.2 Explain various pressure measurements
- 8.1.3 Identify various types of fire hydrants
- 8.1.4 Identify alternative water supplies

**CONTENT STANDARD 9.0 : EXPLORE THE PRINCIPLES OF LOSS CONTROL****PERFORMANCE STANDARD 9.1 : DESCRIBE LOSS CONTROL**

- 9.1.1 Explain the philosophy of loss control
- 9.1.2 Practice safety procedures during overhaul operations
- 9.1.3 Explore fire scene preservation and property conservation

**PERFORMANCE STANDARD 9.2 : DEMONSTRATE SALVAGE COVER USE**

- 9.2.1 Describe salvage procedures
- 9.2.2 Demonstrate the uses of a salvage cover

**CONTENT STANDARD 10.0 : EXPLORE FIRE-BASED EMERGENCY MEDICAL CARE****PERFORMANCE STANDARD 10.1 : COMPLETE EMERGENCY MEDICAL TRAINING**

- 10.1.1 Obtain certification in First Aid and CPR training that meets the requirements of a recognized national standard (e.g., Red Cross, American Heart Association)
- 10.1.2 Create a safety equipment training plan
- 10.1.3 Assess emergency and/or disaster situations
- 10.1.4 Design an emergency or disaster plan

**CONTENT STANDARD 11.0 : DEFINE HAZARDOUS MATERIALS AWARENESS****PERFORMANCE STANDARD 11.1 : INTRODUCTION TO HAZARDOUS MATERIALS**

- 11.1.1 Describe the properties of hazardous materials
- 11.1.2 Identify hazardous materials
- 11.1.3 Understand the elements of hazardous materials
- 11.1.4 Explain the use of personal protective equipment for hazardous materials incidents
- 11.1.5 Obtain certification of completion in Hazardous Materials Awareness



**CONTENT STANDARD 12.0 : EXAMINE THE CONCEPTS OF WILDLAND FIRE****PERFORMANCE STANDARD 12.1 : CHARACTERIZE THE CONCEPTS OF BASIC WILDLAND FIRE BEHAVIOR**

- 12.1.1 Identify and discuss the fire triangle, as it pertains to wildland fires
- 12.1.2 Connect the contributing factors that indicate the potential for increased fire behavior and compromised safety
- 12.1.3 Describe causes of extreme fire behavior (long range spotting, crowning, and fire whirls) due to weather, fuels, topography, or S190

**PERFORMANCE STANDARD 12.2 : APPLY CONCEPTS OF BASIC WILDLAND FIRE SUPPRESSION**

- 12.2.1 Complete National Wildfire Coordination Group (NWCG), S130, L180, or equivalent (wildland firefighting)
- 12.2.2 Explain the “LCES” (Lookouts, Communications, Escape Routes, and Safety Zones) and how it relates to standard firefighting orders and watch-out situations
- 12.2.3 Explore concepts of fireline construction to proper standards, applying various methods
- 12.2.4 Discuss the holding actions on a fireline, using various methods
- 12.2.5 Discuss fire suppression techniques with the use of water
- 12.2.6 Discuss fire suppression techniques without the use of water
- 12.2.7 Complete all assigned tasks in regards to basic wildland fire suppression in a safe and efficient manner
- 12.2.8 Describe environmental factors that could impact firefighter safety
- 12.2.9 Complete IS320 certification (FEMA self-study on wildfire mitigation basics)