

# FIRE SCIENCE TECHNOLOGY

## Fire Science Technology: Associate of Applied Science Degree

**Certificate of Completion: Basic Firefighter**

(575) 528-7321

Every year, fires and other emergencies claim thousands of lives and cause billions of dollars in property damage. Firefighters play a critical role in protecting communities by responding to emergencies, extinguishing fires, providing medical aid, and ensuring public safety. They are often the first responders at traffic accidents, medical crises, and hazardous situations, and at the same time performing vital lifesaving functions.

The demand for trained firefighters continues to grow. According to the United States Fire Administration, nearly 70% of fire companies rely on volunteer firefighters, with many transitioning to paid positions. Employment opportunities are expected to expand due to this shift, as well as the need to replace retiring firefighters or those advancing into other emergency service roles.

Doña Ana Community College's **Fire Science Technology Program**, accredited by the International Fire Service Accreditation Congress (IFSAC), provides comprehensive training for individuals seeking to enter or advance in the fire service profession. Students gain foundational knowledge in firefighting principles and participate in **live training exercises** to develop real-world experience.

This program offers two academic pathways:

- **Associate of Applied Science (AAS) in Fire Science Technology** - Designed for those pursuing a career in fire protection or seeking career advancement.
- **Certificate of Completion in Firefighting** - Provides essential training and certification for entry-level positions

This program serves:

- **Aspiring firefighters** - Equipping them with the fundamental skills and knowledge necessary to enter the profession.
- **Current firefighters** - Includes career, volunteer, and NMSU student firefighters who seek to enhance their skills, improve job performance, and prepare for leadership roles.

With a combination of technical instruction and general education courses, students graduate ready to serve their communities as highly skilled fire service professionals.

**NOTE:** An articulation agreement with the N.M. Firefighters Training Academy makes it possible to receive college credit for experience and IFSAC certification. All courses in this program may be applied toward a Bachelor of Applied Studies or Bachelor of Individualized Studies degree at NMSU.

**NOTE:** Students wishing to enter the fire service will benefit from the educational background provided and may receive certifications in various fire-related areas through the New Mexico Firefighters Training Academy in Socorro, N.M., and the IFSAC.

## Program Accreditation

The Fire Science Program is accredited by the International Fire Service Accreditation Congress (<https://ifsac.org/>).

## Medical Clearances and Background Checks

Several courses in the program may require the student to submit a medical clearance physical, mask fit test, and a background check. See a program advisor for details.

**NOTE:** A criminal history may prohibit students from being hired or certified by agencies. Students are encouraged to check with the prospective agency and identify that agency's specific requirements prior to enrolling in this program.

## Physical Abilities

This program requires that the student be able to:

- lift, carry and balance up to 125 pounds (250 pounds with assistance)
- assume a variety of postural positions and be capable of physical maneuvers ranging from crawling, kneeling, squatting, twisting, turning, and bending, to climbing stairs and ladders
- withstand varied environmental conditions such as extreme heat, cold, and moisture

## Technology Competencies

In an effort to assist students with adequate preparation for their coursework at DACC, technology competencies have been identified and established. These competencies are in effect for all courses taken in the Fire Science Technology program. Students must possess the following minimum competencies. Additional competencies may be required for particular courses/programs:

- Access course and program material on the Web using CANVAS and an applicable web browser
- Correspond with DACC students and faculty using e-mail and the Web
- Read/print e-mail and attachments/files from students and faculty
- Complete, send, and receive assignments using e-mail and attachments/files
- Use the DACC Library e-books, e-journals, databases, or credible World Wide Web resources for research and completion of course assignments
- Prepare and conduct presentations in the classroom using presentation equipment as required.
- Use the appropriate software for a given course (DACC uses as standards Microsoft products, including MS Word, MS Project, MS Excel, and MS PowerPoint)
- Use an appropriate anti-virus application to ensure the files transmitted and received are virus free
- Use recommended plagiarism review software to ensure work is not plagiarized

Fire Science Technology - Associate of Applied Science (<https://catalogs.nmsu.edu/dona-ana/academic-career-programs/fire-science-technology/fire-science-technology-associate-applied-science/>)

Basic Firefighter - Certificate of Completion (<https://catalogs.nmsu.edu/dona-ana/academic-career-programs/fire-science-technology/basic-firefighter-certificate-completion/>)

**FIRE 102. Fire Fighter I and II**  
**12 Credits (12)**

This course will train the student as outlined in NFPA 1001, Fire Fighter Professional Qualifications. Firefighter I & II Certification issued through the New Mexico Firefighter's Training Academy (NMFTA) upon successful completion [International Fire Service Accreditation Congress (IFSAC) & Pro Board accredited]. Consent of Instructor required.

**Prerequisite/Corequisite:** FIRE 115, FIRE 252, OEEM 103. Restricted to Dona Ana campus only.

#### **Learning Outcomes**

1. Describe basic fire department organizational structure and operating procedures.
2. Recognize probable fire behaviors and how to manage them appropriately.
3. Identify and manage hazardous materials.
4. Identify characteristics of building construction; recognize signs of building collapse.
5. Demonstrate the safe use, cleaning, refilling, inspecting, and storing of SCBA bottles.
6. Identify and properly use portable fire extinguishers.
7. Identify and properly tie knots used in the fire service; use and maintain various types of rope used in the fire service.
8. Conduct search and rescue drills as a member of Fire Company.
9. Identify and appropriately use techniques for forcible entry tools. 1
10. Identify and demonstrate knowledge and techniques used with fire service ground and aerial ladders. 1
11. Apply ventilation practices to effectively ventilate buildings. 1
12. Learning fundamentals of water supply and securing water sources. 1
13. Demonstrate coupling, loading, and rolling fire hose. 1
14. Demonstrate hydrant connections using various lays and connections. 1
15. Identify and operate nozzles and smooth bore tips for fire streams. 1
16. Become familiar with strategies and tactics in fire extinguishment. 1
17. Become familiar with use and operation of fire sprinklers. 1
18. Perform salvage and overhaul operations. 1
19. Identify and use various fire service communications systems. 2
20. Define the types of special rescues encountered by fire fighters. 2
21. Describe the steps of a special rescue. 2
22. Describe the general procedures at a special rescue scene. 2
23. Describe how to safely approach and assist at a vehicle or machinery rescue incident. 2
24. Describe how to safely approach and assist at a confined space rescue incident. 2
25. Describe how to safely approach and assist at a rope rescue incident.

#### **FIRE 112. Principles of Emergency Services**

##### **3 Credits (3)**

This course provides an overview to fire protection and emergency services including career opportunities in fire protection and related fields. The organization and function of public and private fire protection services is studied including how fire departments fit as part of local government. An overview of laws and regulations affecting the fire service is explored along with specific fire protection functions and responsibilities including basic fire chemistry and physics, introduction to fire strategy and tactics and life safety initiatives.

#### **Learning Outcomes**

1. Illustrate and explain the history and culture of the fire service.
2. Differentiate between fire service training and education and explain the value of higher education to the professionalization of the fire service.
3. List and describe the major organizations that provide emergency response service and illustrate how they interrelate.
4. Identify fire protection and emergency service careers in both the public and private sectors.
5. Define the role of national, state, and local support organizations in fire and emergency services.
6. Discuss and describe the scope, purpose, and organizational structure of fire and emergency services.
7. Describe the common types of fire and emergency service facilities, equipment, and apparatus.
8. Compare and contrast effective management concepts for various emergency situations.
9. Identify and explain the components of fire prevention including code enforcement, public information, and public and private fire protection systems. 1
10. Recognize the components of career preparation and goal setting. 1
11. Describe the importance of wellness and fitness as it relates to emergency services.

#### **FIRE 114. Fire Behavior and Combustion**

##### **3 Credits (3)**

This course explores the theories and fundamentals of how and why fires start, spread, and are controlled. Restricted to: Community colleges only.

#### **Learning Outcomes**

1. Identify physical properties or 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. Discuss various materials and their relationship to fires as fuel.
7. Demonstrate knowledge of the characteristics of water as a fire suppression agent.
8. Explain types of suppression agents and strategies.
9. Compare and contrast differing methods and techniques of fire extinguishments.

#### **FIRE 115. Hazardous Materials Awareness and Operations**

##### **3 Credits (3)**

This course will train the student to the Hazardous Materials Awareness and Operations level as outlined in NFPA 472, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents and OSHA 29 CFR 1910.120. Hazardous Materials Awareness and Operations certification issued through the New Mexico Firefighter's Training Academy upon successful completion (IFSAC accredited).

#### **Learning Outcomes**

1. Identify the definition of hazardous materials (or dangerous goods, in Canada) and WMD.
2. Identify typical container shapes that can indicate hazardous materials/WMD.
3. Identify the UN/DOT hazard classes and divisions of hazardous materials and identify common examples of materials in each hazard class or division.

4. Identify the difference between hazardous materials/WMD incidents and other incidents.
5. Identify typical occupancies and locations in the community where hazardous materials/WMD are manufactured, transported, stored, used, or disposed of.
6. Identify facility and transportation markings and colors that indicate hazardous materials/WMD.
7. Identify sources of information for determining the correct mass decontamination procedures and identify how to access those resources in a hazardous material/WMD incident.
8. Identify the supplies and equipment required to set up and implement technical decontamination operations.
9. Identify procedures, equipment, and safety precautions for communicating with crowds and crowd management techniques that can be used at incidents where a large number of people might potentially be contaminated. 1
10. Describe products potentially encountered in the incident associated with WMD suspicious letter, package, illicit laboratory, WMD agent and environmental crimes. 1
11. Describe the procedures for maintaining the evidentiary integrity of any item removed from the crime scene. 1
12. Select the personal protective equipment required to support evidence preservation and sampling at hazardous materials/WMD incidents based upon local procedures. 1
13. Select the personal protective equipment required to support victim rescue and recovery at hazardous materials/WMD incidents based on local procedures.
10. Analyze the laws of physics that permit drafting operations. 1
11. Explain and apply the formulas used by the fire service for determining: vertical and horizontal range of fire streams, nozzle reaction, back pressure, and relay operations. 1
12. Identify the source of water used for firefighting. 1
13. Evaluate other fire ground formulas used for the proper operation of sprinkler systems, standpipes, and hydrants. 1
14. List and discuss the role of hose, nozzles, and appliances used during pump operations. 1
15. Distinguish among types of foam used in the fire service. 1
16. Identify foam application techniques. 1
17. Install and operate an inline foam eductor. 1
18. Evaluate the relationship of flow, pressure, shape, and nozzle reaction in the design and operation of a nozzle.

#### **FIRE 126. Fire Prevention**

##### **3 Credits (3)**

This course will educate students about the principles and techniques of fire prevention and life-safety inspection and code compliance in accordance to NFPA 1031, Standard for Professional Qualifications for Fire Inspector and Plan Examiner, Level I. Students who meet all course requirements will be eligible for International Fire Service Accreditation Congress (IFSAC) certification through the New Mexico Firefighters' Training Academy (NMFTA). Restricted to Community Colleges campuses only.

##### **Learning Outcomes**

1. Define the national fire problem and the 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, Plan examine, 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.

#### **FIRE 128. Apparatus and Equipment**

##### **2 Credits (2)**

The course will train students on attitude and skill requirements for becoming a safe and effective fire apparatus driver/operator. The focus will be on apparatus inspection, operation, maintenance, and specification. Responsibilities of the driver/operator will be taught and assessed consistent with applicable NFPA standards and the New Mexico Firefighters' Training Academy (NMFTA) guidelines. Students pursuing certification must possess a current and valid New Mexico driver's license. Students who meet all course requirements will be eligible for International Fire Service Accreditation Congress (IFSAC) certification through the NMFTA. Restricted to Community Colleges campuses only.

##### **Learning Outcomes**

1. Identify the pumps used by the fire service and demonstrate their operations.
2. Discuss the importance of understanding pump operating principles and construction.
3. Identify the sources of water used for firefighting.

#### **FIRE 120. Fire Protection Hydraulics and Water Supply**

##### **3 Credits (3)**

This course will train students on skill requirements for becoming a safe and effective fire apparatus driver/operator. The focus will be on pump operation, construction, testing, and mathematical calculation required for effective pump operation and fire control. Responsibilities of the driver/operator will be taught and assessed consistent with applicable NFPA standards and the New Mexico Firefighters' Training Academy (NMFTA) guidelines. Students who meet all course requirements will be eligible for International Fire Service Accreditation Congress (IFSAC) certification through the NMFTA. Consent of Instructor required. Restricted to Community Colleges campuses.

**Prerequisite/Corequisite:** FIRE 128.

##### **Learning Outcomes**

1. Define and explain hydraulic applications within the fire service.
2. Analyze the chemical and physical properties of water including latent heat and specific heat.
3. Examine the use of water as an extinguishing agent and how it relates to BUT's absorbed and generated steam.
4. Calculate pressure, force an area using hydraulic formulas.
5. Explain the six principles of pressure as they apply to water.
6. Discuss the use of basic fireground formulas to estimate effective pump operations.
7. Explain and apply the formulas used by the fire service, determining: Gallons per minute, nozzle pressure, friction loss, and pump discharge pressure.
8. Identify the pumps used by the fire service and demonstrate their operations.
9. Discuss the importance of understanding pump operating principles and construction. 1

4. Assess the basic attributes of a good driver and how basic vehicle operations, defensive driving, speed, and environmental conditions affect safe driving.
5. Explain the importance of preventive maintenance and its documentation.
6. Describe features and capacities of various fire department apparatus.
7. Identify the considerations taken when selecting qualified driver/operators.
8. Safely drive fire apparatus and successfully complete the NFPA obstacle course.
9. Describe apparatus positioning as it applies to different types of apparatus. 1
10. Describe the characteristics of water. 1
11. Summarize facts about performance testing of fire pumps. 1
12. Distinguish among performance tests for puming apparatus.

### **FIRE 130. Principles of Fire and Emergency Services Safety and Survival 3 Credits (3)**

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. Consent of instructor required. Restricted to: Community colleges only.

#### **Learning Outcomes**

1. Define cultural change.
2. Evaluate methods for enhancing accountability.
3. Apply risk management techniques.
4. List steps for eliminating unsafe acts.
5. Identify training and certification standards.
6. identify medical and fitness standards.
7. Explain how using available technology enhances safety.
8. Identify the NIOSH top five and apply them to case studies in evaluating prevention measures.
9. Describe the importance of establishing response standards. 1
10. Evaluate considerations for response to violent incidents. 1
11. Evaluate methods for providing emotional support.

### **FIRE 200. Special Topics 1-12 Credits (1-12)**

Specific subjects to be announced in the Schedule of Classes. Course may be repeated for credit as topics change. May be repeated up to 12 credits. Consent of Instructor required. Restricted to Community Colleges campuses only.

### **FIRE 201. Independent Study 1-3 Credits**

Research on an approved topic to meet graduation requirements. Meets or exceeds NFPA standards. May be repeated for total of 9 credits.

**Prerequisite:** consent of instructor.

### **FIRE 203. Fire and Emergency Services Administration 3 Credits (3)**

This course will provide students entry-level training in company operations and administration at the first-line supervisory level. The student will learn how to effectively manage human resources and community/public relations. Students will learn about fire department organization and administration; including budgets, reports, and planning. Students will learn the process involved in fire inspection, investigation, public education, emergency service delivery, and safety, per NFPA Standard 1021, Fire Officer Professional Qualifications.

#### **Learning Outcomes**

1. Acknowledge career development opportunities and strategies for success.
2. Recognize the need for effective communication skills both written and verbal.
3. Identify and explain the concept of span and control, effective delegation, and division of labor.
4. Select and implement the appropriate disciplinary action based upon an employee's conduct.
5. Explain the history of management and supervision methods and procedures.
6. Discuss the various levels of leadership, roles, and responsibilities within the organization.
7. Describe the traits of effective versus ineffective management styles.
8. Identify the importance of ethics as it relates to fire and emergency services.
9. Identify the roles of the National Incident Management System (NIMS) and Incident Management System (ICS).

### **FIRE 210. Building Construction for Fire Protection 3 Credits (3)**

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. Restricted to: Community colleges only.

#### **Learning Outcomes**

1. Describe building construction as it relates to firefighter safety, building 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.

### **FIRE 214. Hazardous Materials Technician 3 Credits (3)**

Knowledge and skills about hazardous materials mitigation needed to certify as a Hazardous Materials Technician Level III. Meets or exceeds NFPA 471, 472, 473 standards, and OSHA 1910.102 part Q, and New Mexico HMER plan. May be repeated up to 3 credits. Restricted to: Community Colleges only.

**Prerequisite:** FIRE 115.

#### **Learning Outcomes**

1. Acquire the skills and knowledge required to perform the functions of a firefighter.



2. Apply the appropriate critical thinking skills necessary to develop an incident action plan using appropriate strategies and tactics to safely manage incidents.

### **FIRE 216. Hazardous Materials Chemistry**

#### **3 Credits (3)**

This course provides basic chemistry relating to the categories of hazardous materials including recognition, identification, reactivity, and health hazards encountered by emergency services. Restricted to: Community colleges only. May be repeated up to 3 credits.

#### **Learning Outcomes**

1. Acquire the skills and knowledge required to perform the functions of a firefighter.

### **FIRE 220. Cooperative Experience I**

#### **1-3 Credits**

Supervised cooperative work program. Student is employed in an approved occupation and rated by the employer and instructor. May be repeated for a maximum of 6 credits. Graded S/U.

**Prerequisite:** consent of instructor.

### **FIRE 221. Cooperative Experience II**

#### **3 Credits (3)**

Apply advanced firefighting knowledge and skills while working with fire protection agencies. Meets or exceeds NFPA standards. Consent of instructor required. Graded: S/U. Restricted to: Community Colleges only.

**Prerequisite(s):** FIRE 220.

### **FIRE 223. Fire Investigations I**

#### **3 Credits (3)**

This course meets the requirements set forth in NFPA 1033 Professional Qualifications for Fire Investigator. This course will give a comprehensive understanding of the principles of fire investigation, scene examination, documentation, evidence collection/preservation, interview techniques, and post-incident investigations. Student who meet all course requirements are eligible for International Fire Service Accreditation Congress (IFSAC) certification through New Mexico Firefighters' Training Academy (NMFTA). Restricted to Community Colleges campuses only.

#### **Learning Outcomes**

1. The student will be able to understand fire science, fire chemistry, thermodynamics, fire dynamics, and exploding of dynamics.
2. The student will be able to understand fire investigations, fire investigations methodology, fire investigation technology, and fire analysis.
3. The student will be able to understand evidence documentation, collection, and preservation.
4. The student will be able to understand computer fire modeling, failure analysis and analytical tools, fire protection systems, electricity and electrical systems, and hazardous materials.

### **FIRE 224. Strategy and Tactics**

#### **3 Credits (3)**

Provides an in-depth analysis of the principles of fire control through utilization of personnel, equipment and extinguishing agents on the fire ground. Covers the development of systematic action plans for emergency situations. Includes recognizing and prioritizing emergency scene needs and developing related strategies, tactics and contingencies. Educates students on how resources should be deployed to implement those plans. Restricted to Community Colleges campuses only.

### **Learning Outcomes**

1. Explain the importance of a fire ground commander.
2. Explain the importance of having standard operating procedures during fire ground operations.
3. Analyze fires by their classification and identify what constitutes a fuel.
4. Describe heat transfer and identify their distinct characteristics.
5. Describe the phases that a fire progresses through and their specific approach to extinguishment.
6. Describe the methods for making proper assumptions in fire situations.
7. Identify and list unique building construction techniques, and their specific approach to extinguishment.
8. Identify the principles behind reduce, fire control, and fire stream operations.
9. Evaluate fire scenarios and apply the appropriate tactics and strategies.

### **FIRE 225. Fire Protection Systems**

#### **3 Credits (3)**

This course provides information relating to the features and 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. Restricted to: Community colleges only.

### **FIRE 230. Fire Service Instructor**

#### **3 Credits (3)**

Provides the instructor candidate with methods and techniques of instruction including oral communications, preparing lesson plans, writing performance objectives, use of audio and other training aids, and the selection, evaluation and preparation of performance tests. Meets and exceeds NFPA 1041 Level I standards. Restricted to: Community Colleges only.

#### **Learning Outcomes**

1. The student shall be able to summarize professional responsibilities of the fire and emergency services instructor.
2. The student shall be able to discuss characteristics of adult learning and describe the different learning domains and learning styles.
3. The student shall be able discuss instructional preparation as it relates to training aid selection, class continuity, and class consistency.
4. The student shall be able discuss instructional materials and equipment and how they are used in the classroom and training environments.
5. The student shall be able discuss the classroom and training ground environments.
6. The student shall be able to discuss skills-based training and safely.

### **FIRE 232. Firefighter Internship**

#### **3 Credits (3)**

Application of knowledge, skills and abilities in a fire service department, as a firefighter intern and integrated member of a fire affiliated agency. Restricted to majors.

**Prerequisites:** FIRE 101, FIRE 102, FIRE 115, FIRE 202 and EMT-B and consent of instructor.

### **FIRE 252. Vehicle Extrication**

#### **2 Credits (1+2P)**

This course will train the student to the Vehicle & Machinery Extrication level I as outlined in NFPA 1006, Standard for Technical Rescuer Professional Qualifications. Vehicle & Machinery Extrication certification

issued through the New Mexico Firefighter's Training Academy upon successful completion (IFSAC accredited). May be repeated up to 2 credits.

**Learning Outcomes**

1. Define extrication, disentanglement, and rescue.
2. Identify organizations relevant to extrication operations.
3. Describe the roles performed by organizations relevant to extrication operations.
4. Identify the responsibilities of the rescue organizations.

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