# Fire Science I Course No. 44100 Credit: 1.0

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| --- | --- | --- | --- |
| **Student name:** |  | **Graduation Date:** |  |

Pathways and CIP Codes:Emergency & Fire Management Services (43.0299)

Course Description: The first of two **application level** courses designed to provide an overview of firefighter safety, fire behavior, PPE, equipment, firefighting techniques, and rescue procedures. The students receive a solid foundation of classroom and hands-on training to prepare them for the Firefighter I National Certification through the Kansas Fire and Rescue Training Institute. [Course may require specialized teacher certification and/or offer professional certification.]

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 1: Firefighter Orientation [NFPA® 1001]

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Describe the history and culture of the fire service. |  |
| 1.2 | Describe the mission of the fire service. |  |
| 1.3 | Explain the fire department organizational principles. |  |
| 1.4 | Distinguish among functions of fire companies. |  |
| 1.5 | Summarize primary knowledge and skills the firefighter must have to function effectively. |  |
| 1.6 | Distinguish among the primary roles of fire service personnel. |  |
| 1.7 | Distinguish among policies, procedures and standard operating procedures. |  |
| 1.8 | Summarize components of the Incident Command System (ICS). |  |
| 1.9 | Distinguish among the functions of the major subdivisions within the ICS structure. |  |

## Benchmark 2: Firefighter Safety and Health [NFPA® 100

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Discuss Occupational Safety and Health Administration (OSHA) regulations. |  |
| 2.2 | Summarize the International Fire Service Training Association (IFSTA) principles of risk management. |  |
| 2.3 | Discuss firefighter health considerations and employee assistance and wellness programs. |  |
| 2.4 | Discuss safety in the fire station. |  |
| 2.5 | Explain how to maintain and service equipment used in training. |  |
| 2.6 | Describe emergency escape and rapid intervention. |  |

## Benchmark 3: Fire Behavior [NFPA® 1001]

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Describe physical and chemical changes of matter related to fire. |  |
| 3.2 | Discuss modes of combustion, the fire triangle and the fire tetrahedron. |  |
| 3.3 | Explain the difference between heat and temperature. |  |
| 3.4 | Describe sources of heat energy. |  |
| 3.5 | Discuss the transmission of heat. |  |
| 3.6 | Explain how the physical states of fuel affect the combustion process. |  |
| 3.7 | Explain how oxygen concentration affects the combustion process. |  |
| 3.8 | Distinguish among classifications of fires. |  |
| 3.9 | Describe the stages of fire development within a compartment. |  |

## Benchmark 4: Firefighter Personal Protective Equipment [NFPA® 1001]

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Describe the purpose of personal protective equipment (PPE). |  |
| 4.2 | Summarize guidelines for the care of personal protective clothing. |  |
| 4.3 | Describe basic Self-Contained Breathing Apparatus (SCBA) care and maintenance. |  |
| 4.4 | Demonstrate effective air management. |  |
| 4.5 | Describe basic Self-Contained Breathing Apparatus (SCBA) component assemblies. |  |
| 4.6 | Demonstrate donning and doffing SCBA. |  |
| 4.7 | Demonstrate proper use of SCBA during emergency situations. |  |
| 4.8 | Demonstrate changing a SCBA cylinder using both the one-person and two-person methods. |  |

## Benchmark 5: Portable Fire Extinguishers [NFPA® 1001]

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Demonstrate the proper selection and use of portable fire extinguishers. |  |
| 5.2 | Distinguish among classifications of fire and the most common agents used to extinguish them. |  |
| 5.3 | Discuss fire extinguisher types and uses. |  |
| 5.4 | Discuss damaged portable fire extinguishers and obsolete portable fire extinguishers (e.g. inspection, care, and maintenance). |  |

## Benchmark 6: Click or tap here to enter text.

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Discuss types of rope and webbing construction. |  |
| 6.2 | Describe parts of a rope and considerations in tying a knot. |  |
| 6.3 | Describe characteristics of knots commonly used in the fire service. |  |
| 6.4 | Demonstrate selecting rope hardware for a given application(s). |  |
| 6.5 | Demonstrate hoisting techniques and safety considerations (e.g. various firefighting apparatus and tools). |  |
| 6.6 | Demonstrate knowledge of tying a variety of knots specific to the fire service (e.g. overhand, bowline, clove hitch, handcuff, figure eight, water knot, etc.). |  |

## Benchmark 7: Rescue and Extrication Techniques [NFPA® 1001]

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Distinguish between rescue and extrication operations. |  |
| 7.2 | Summarize safety guidelines for search and rescue personnel. |  |
| 7.3 | Describe actions that should be taken by a rapid intervention crew (RIC/RIT) when a firefighter is in distress. |  |
| 7.4 | Demonstrate conducting a primary and secondary search. |  |
| 7.5 | Demonstrate various emergency rescue carries (e.g. incline drag, webbing drag, cradle in arms lift/carry, seat lift/carry, extremities lift/carry, etc.). |  |
| 7.6 | Explain and demonstrate firefighter survival techniques. |  |
| 7.7 | Discuss fire ground search and rescue principles. |  |
| 7.8 | Explain strategies for victim removal from a fire. |  |
| 7.9 | Explore rescue and extrication tools and equipment. |  |
| 7.10 | Demonstrate technical rescue techniques. |  |
| 7.11 | Demonstrate vehicle extrication techniques. |  |

## Benchmark 8: Forcible Entry Procedures [NFPA® 1001]

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 8.1 | Explain the basic principles of forcible entry. |  |
| 8.2 | Describe considerations a firefighter must take when using forcible entry tools. [NFPA® 1001, 5.3.4] |  |
| 8.3 | Describe forcible entry methods for breaching various construction types of walls and floors (e.g. hand tools, power tools, etc.). |  |
| 8.4 | Select appropriate cutting tools for specific applications. |  |
| 8.5 | Identify considerations that need to be taken when forcing entry through locks, padlocks, overhead doors, and fire doors. |  |
| 8.6 | Summarize general care and maintenance practices for forcible entry tools. |  |
| 8.7 | Explain the ways to force entry through various types of doors, fences, and gates. |  |
| 8.8 | Explain how fire doors operate. |  |
| 8.9 | Describe various forcible entry techniques using through-the-lock method. |  |
| 8.10 | Describe rapid-entry lockbox systems. |  |
| 8.11 | Explain actions that can be taken to force entry involving padlocks. |  |
| 8.12 | Describe forcible entry methods used for various types of windows. |  |
| 8.13 | Discuss hazards in forcing entry through various types of windows and covers. |  |

## Benchmark 9: Ground Ladders [NFPA® 1001]

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 9.1 | Identify the parts of a ladder including markings and labels. |  |
| 9.2 | Describe types of ladders used in the fire service. |  |
| 9.3 | Explain the inspection and maintenance of ladders. |  |
| 9.4 | Summarize factors that contribute to safe ladder operations. |  |
| 9.5 | Describe proper procedures for positioning ground ladders. |  |
| 9.6 | Explain precautions to take before raising and climbing a ladder. |  |
| 9.7 | Describe methods for lowering conscious and/or unconscious victims down ground ladders. |  |
| 9.8 | Demonstrate selecting, carrying, and raising a ladder properly for various types of activities. |  |

## Benchmark 10: Ventilation [NFPA® 1001]

### Competencies

| **#** | **Description** | **rating** |
| --- | --- | --- |
| 10.1 | Discuss factors that are considered when deciding the need to ventilate a building. |  |
| 10.2 | List precautions to observe when undertaking vertical ventilation. |  |
| 10.3 | List warning signs of unsafe roof condition. |  |
| 10.4 | Explain procedures for ventilation of a conventional basement. |  |
| 10.5 | Distinguish between advantages and disadvantages of various ventilation techniques (e.g. vertical, horizontal, natural, hydraulic, mechanical). |  |

## Benchmark 11: Water Supply Connections and Operations [NFPA® 1001]

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 11.1 | Describe dry-barrel and wet-barrel hydrants. |  |
| 11.2 | Describe types of fire hydrants, hydrant markings, and location. |  |
| 11.3 | Summarize potential problems to look for when inspecting fire hydrants. |  |
| 11.4 | Demonstrate operating a hydrant. |  |
| 11.5 | Discuss alternative water supply sources and methods of access. |  |
| 11.6 | Explain water supply principles. |  |
| 11.7 | Discuss extinguishing properties of water and foam. |  |
| 11.8 | Explain how pressure is gained and lost in a water distribution system. |  |
| 11.9 | Describe methods used for rural water supply operations. |  |

## Benchmark 12: Fire Hose Methods and Operations [NFPA® 1001]

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 12.1 | Discuss general inspection, care, and maintenance of fire hose. |  |
| 12.2 | Distinguish between characteristics of threaded couplings and non-threaded couplings. |  |
| 12.3 | Describe the characteristics of hose appliances and tools. |  |
| 12.4 | Explain basic hose loads and finishes. |  |
| 12.5 | Demonstrate methods used for basic supply hose lays. |  |
| 12.6 | Demonstrate techniques for operating hose lines. |  |
| 12.7 | Demonstrate techniques for loading hose. |  |

## Benchmark 13: Fire Stream Factors [NFPA® 1001]

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 13.1 | Discuss the extinguishing properties of water. |  |
| 13.2 | Demonstrate and explain the use of fire hose streams and nozzles. |  |
| 13.3 | Discuss how pressure is lost or gained in a fire hose. |  |
| 13.4 | Discuss causes of a water hammer in fire streams. |  |
| 13.5 | Compare various types of fire stream patterns and nozzles. |  |
| 13.6 | Compare proportioners, delivery devices, and generating systems. |  |
| 13.7 | Explore methods of dispensing firefighting foam. |  |
| 13.8 | Demonstrate assembling a foam fire stream system. |  |
| 13.9 | Discuss foam application techniques and hazards. |  |

## Benchmark 14: Fire Control/Suppression [NFPA® 1001]

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 14.1 | Summarize considerations prior to entering a burning building. |  |
| 14.2 | Describe direct attack, indirect attack and combination attack. |  |
| 14.3 | Discuss deploying master stream devices. |  |
| 14.4 | Describe aerial devices used to deliver elevated master streams. |  |
| 14.5 | Discuss responsibilities of companies in structural fires. |  |
| 14.6 | Explain action taken when performing firefighting and rescue operations in confined space. |  |
| 14.7 | Demonstrate how to suppress structure fires. |  |
| 14.8 | Demonstrate how to suppress ground cover fires. |  |
| 14.9 | Demonstrate how to deploy master streams at a fire. |  |
| 14.10 | Compare suppression techniques of class A, B, and C fires. |  |
| 14.11 | Explore company level fire tactics. |  |

## Benchmark 15: Conserve and Salvage Property and Loss Control [NFPA® 1001]

### Competencies

| **#** | **Description** | **Rating** |
| --- | --- | --- |
| 15.1 | Explain the philosophy of loss control. |  |
| 15.2 | Demonstrate care, maintenance, and storage of salvage equipment. |  |
| 15.3 | Demonstrate various techniques for conservation and salvage of property (e.g. water chute, salvage covers, catchall, etc.). |  |
| 15.4 | Discuss the difficulties that hidden fires represent to firefighters. |  |
| 15.5 | Identify various overhaul techniques and procedures. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

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