MISSION VALLEY REGIONAL OCCUPATION PROGRAM

**FIRE TECHNOLOGY COURSE OUTLINE**

**Course Title**: Fire Technology

**CBEDS Title**: Firefighting

**CBEDS Number**: 5833

**Hours:** 360

**Date of Revision:** February 2023

**Course Description**:

This course prepares students in core skills needed for the Fire Technology industry. Students will develop physical fitness to prepare for the physical agility required to enter a Fire Academy. Students will receive skills instruction on various testing parameters of the nationally approved and recognized Certified Physical Agility Test (CPAT). Student completers will have basic firefighting knowledge and manipulative skills from hands-on training that will lead to advanced training and certification. Included in the fire technology course are: firefighter safety, fire behavior, building construction, personal protective equipment (SCBA) & clothing, portable extinguishers, ropes & knots, rescue & extrication, forcible entry tools & techniques, ground ladders, ventilation, water supply, handling fire hose, water fire streams, fire control, fire detection & alarm systems, loss control, protecting evidence for fire cause, communication equipment & techniques, and fire prevention & public education. Students will develop skills needed for recognizing and caring for victims in emergency situations, including patient assessment, cardiopulmonary resuscitation with the use of an automated external defibrillator, and prevention of disease transmission.

This course also provides an overview to fire protection and emergency services, career opportunities in fire protection, 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 terminology, specific fire protection functions, basic fire chemistry and physics, introduction to fire protection systems, introduction to fire strategy and tactics, and life safety initiatives. Integrated throughout the course are Career Preparation Standards, which include Workplace Basic Skills and Behaviors, Career Technical Skills, and Job Employment Skills.

**Course Outline:**

Upon successful completion of this course, students will be able to demonstrate the following skills necessary for entry-level employment.

## **WORKPLACE BASIC SKILLS & BEHAVIORS**

1. Apply skills learned in class.
2. Analyze information and make decisions.
3. Communicate verbally and in writing.
4. Work independently and as a team member in a diverse workplace.
5. Work reliably, responsibly, and ethically.
6. Identify sexual harassment issues.
7. Recognize International Assoc. Fire Fighters & union affiliates.

# **CAREER TECHNICAL SKILLS**

1. Use appropriate technology.
2. Understand and practice occupational safety standards.
3. Demonstrate an awareness of how a business or industry functions.

**JOB EMPLOYMENT SKILLS**

1. Develop a plan to achieve career goals.
2. Use effective job search strategies

* complete a professional resume
* fill out a job application
* practice industry written exam testing
* prepare for oral board interviewing

1. Demonstrate an awareness of the importance of lifelong learning.

# **FIRE FIGHTING-CONTENT AREA SKILLS**

**FIREFIGHTER ORIENTATION**

1. State the mission of the fire service.
2. Match fire department organizational principles to their descriptions. Match fire companies to their functions and duties.
3. Explain and illustrate the history & culture of the fire service.
4. List the primary knowledge and skills needed by a firefighter to function effectively.
5. List typical duties of a Firefighter I and a Firefighter II.
6. Match fire department personnel to their primary roles.
7. Match special operations personnel to their primary responsibilities.
8. Match fire prevention, emergency medical services, and training personnel to their primary responsibilities.
9. Select facts about fire department regulations.
10. Identify the major operational positions within the Incident Management System (IMS) structure.
11. Match IMS terms to their definitions.
12. Select facts about implementing an IMS.
13. List and describe the major organizations that provide emergency response service and illustrate how they relate.
14. Define the role of national, state and local support organizations in fire service and emergency services.

# **FIREFIGHTER SAFETY**

1. Select facts about firefighter safety.
2. List firefighter health considerations.
3. List areas in which an employee assistance program can help.
4. Select facts about an employee assistance program.
5. Select facts about safety on the apparatus.
6. Safely mount, use apparatus safety equipment, and dismount apparatus.
7. Select facts about personal safety in the fire station.
8. Demonstrate proper lifting techniques.
9. List general safety procedures for using station shop hand tools and power tools.
10. List safety rules for using power saws.
11. Select facts about training safety.
12. Select facts about emergency scene safety.

**FIRE BEHAVIOR**

1. Match terms to their definitions.
2. Define vocabulary words.
3. Distinguish among the three methods of heat transfer.
4. State the Law of Conservation of Mass-Energy.
5. Identify chemical reactions.
6. Provide examples of oxidation.
7. Use the fire tetrahedron to explain combustion.
8. Select facts about oxidizing agents.
9. Select and correct incorrect statements about fuel characteristics.
10. Explain how fuel gases evolve from solids and liquids.
11. Provide specific examples of each source of chemical and electrical heat energy.
12. Describe ways in which mechanical and nuclear heat are generated.
13. Identify stages of compartment fire development.
14. List factors that affect fire development.
15. Explain why thermal layering is critical to firefighting activities.
16. List signs of possible backdraft.
17. Facts about the products of combustion.
18. Facts about fire extinguishment theory.
19. Match fire classes to their descriptions.
20. Match fire classes to their primary extinguishment methods.

**BUILDING CONSTRUCTION**

1. Match Roman numeral building construction types to their basic structural characteristics.
2. Match Roman numeral classifications to their building construction descriptions.
3. Match types of construction to descriptions of the primary fire hazards associated with each.
4. Distinguish among types of walls.
5. List firefighting hazards related to construction.
6. Answer questions about the hazards associated with lightweight and truss construction.
7. List factors that increase fire risk in buildings being constructed, renovated or demolished.
8. List signs of potential building collapse.
9. List actions to take when imminent building collapse is suspected.

**FIREFIGHTER PERSONAL PROTECTIVE EQUIPMENT–PROTECTIVE CLOTHING**

1. Match articles of protective clothing and equipment to their correct functions.
2. Select facts about personal protective gear.
3. Don and doff articles of protective clothing/ equipment.
4. List the four hazardous atmospheres that require the firefighter to wear SCBA.
5. Match toxic atmospheres to their characteristics.
6. Match toxic atmospheres to their sources.
7. Match toxic atmospheres to locations in which they are most likely to be found.
8. Select facts about hazardous substances and atmospheres.

**FIREFIGHTER PERSONAL PROTECTIVE EQUIPMENT SELF-CONTAINED BREATHING APPARATUS (SCBA)**

1. List physical, mental, and medical factors that affect the firefighter’s ability to use SCBA.
2. Describe equipment and air-supply limitations of SCBA
3. List characteristics of open-circuit and closed-circuit SCBA.
4. Label the components and safety features of an SCBA.
5. Match SCBA components to their functions.
6. Complete precautions for safe SCBA use.
7. Complete guidelines for correcting emergency situations while wearing SCBA.
8. Complete recommendations for the use of PASS devices.
9. Select from a list of guidelines general to donning the facepiece and doffing all types of SCBA.
10. Don and doff open-circuit SCBA, using over-the-head and coat methods, and from the compartment or backup mounts.
11. Operate in areas of obscured visibility while wearing SCBA.
12. Exit a constricted opening while wearing standard SCBA.
13. Change an SCBA cylinder “on the scene”.
14. Refill an SCBA cylinder.
15. Select facts about SCBA operation, use, and maintenance.
16. Clean, sanitize, and inspect an SCBA unit.

**PORTABLE EXTINGUISHERS**

1. Identify types of portable fire extinguishers.
2. Select facts about the portable fire extinguisher rating system.
3. Match extinguisher symbol shapes to fire classification letters.
4. Match extinguisher pictographs to the extinguisher’s intended applications.
5. List factors for selecting the proper portable extinguisher.
6. List general guidelines for portable extinguisher operation.
7. Extinguish small Class A, Class B, and Class C fires with the proper portable fire extinguishers.
8. Select facts about fire extinguisher inspection, damage, and obsolescence.

**ROPES & KNOTS**

1. Distinguish between life safety and utility rope applications.
2. List criteria for reusing life safety rope.
3. Match rope materials to their descriptions.
4. Select facts about rope construction.
5. List basic guidelines for rope care and maintenance.
6. List reasons for removing the rope from service.
7. Inspect rope.
8. Select facts about rope cleaning and storage.
9. Coil and uncoil rope.
10. Bag or bird’s-nest coil rope for machine washing or storage.
11. Clean rope.
12. Label knot elements.
13. Match knots to their primary applications.
14. Tie knots which are commonly used in the fire service.
15. List hoisting safety considerations.
16. Tie approved knots and hoist tools and equipment.

**RESCUE & EXTRICATION-BUILDING SEARCH /VICTIM REMOVAL**

1. Distinguish between rescue and extrication operations.
2. State the objectives of building search.
3. Define primary search and secondary search.
4. Select guidelines for rescue from burning buildings.
5. Select facts about firefighters who become trapped or disoriented.
6. List safety guidelines for search operations within buildings.
7. Move an injured victim to safety using appropriate carries, drags, and stretchers.
8. Identify vehicle extrication and rescue.
9. Identify different types of emergency medical care, including recognizing the signs of someone needing CPR.
10. Perform high-quality CPR techniques on adults, children, & babies
11. Identify treatments for shock
12. Demonstrate the technique for relief of foreign-body airway obstruction (choking) for adults and infants

**FORCIBLE ENTRY TOOLS**

1. Identify cutting tools.
2. Identify prying tools.
3. Identify pushing/ pulling tools.
4. Identify striking tools.
5. Match selected forcible entry tools to their basic applications.
6. Identify tools used for through-the-lock forcible entry.
7. Break a door lock.
8. Identify tools for breaking padlocks.
9. Break a padlock.
10. List forcible entry tool safety rules.
11. Describe the correct methods for carrying forcible entry tools.
12. List general care & maintenance practices for forcible entry tools.

**FORCIBLE ENTRY CONSTRUCTION & TECHNIQUES**

1. Identify types of wood swinging doors and jambs.
2. Match metal swinging doors to their description.
3. Identify types of sliding, revolving, and overhead doors.
4. Select facts about fire doors.
5. Identify locks and locking devices.
6. Complete safety rules for breaking glass.
7. Properly break ordinary and tempered plate glass.
8. Select facts about forcing swinging, sliding, revolving, and overhead doors.
9. Force doors of different types and mounts.
10. List methods of forcible entry in special circumstances.
11. Describe ways of gaining entry past fences.
12. Identify types of windows.
13. Select facts about forcing windows and screened & barred openings.
14. Force different types of windows.
15. Select facts about opening floors and walls.
16. Open a metal wall.
17. Open a wood floor.

**GROUND LADDERS**

1. Label the parts of a fire service ladder.
2. Identify types of fire service ground ladders.
3. Clean and inspect a ladder.
4. List ladder safety rules.
5. Select facts about selecting the proper ladder for the job.
6. Demonstrate ladder lifts and carries.
7. Select facts about ground ladder placement.
8. Secure a raised ladder.
9. Demonstrate ladder raises from various carries.
10. Properly climb and work from ground ladders, with and without a safety harness.
11. Assist conscious and unconscious victims down ground ladders.

**VENTILATION**

1. Define ventilation.
2. Match types of ventilation to their descriptions.
3. List advantages of ventilation for specific rescue, attack, conservation, and fire control operations.
4. Identify signs of potential backdraft.
5. List the primary ventilation method used to prevent backdraft.
6. Select and correct false statements about ventilation decisions.
7. List life safety hazards that can affect firefighters and rescue workers in unventilated buildings.
8. Select from a list of building factors that aid the firefighter in determining whether to use vertical or horizontal ventilation.
9. List special considerations associated with ventilating high-rise buildings.
10. List special considerations associated with ventilating windowless buildings and basements.
11. Select from a list of ways in which vertical fire extension occurs.
12. List factors that have a bearing on the location and size of a ventilation opening.
13. Select and correct false statements about safety precautions that should be observed when performing vertical ventilation.
14. Identify roof construction designs.
15. Identify existing roof openings.
16. Discuss the three basic types of roofs as they relate to ventilation operations.
17. Ventilate pitched and flat roofs.
18. Describe ways in which horizontal fire extension occurs.
19. List the advantages and disadvantages of forced ventilation.
20. Demonstrate mechanical positive-and negative-pressure ventilation.
21. Demonstrate hydraulic ventilation.

**WATER SUPPLY**

1. Match to their correct definitions of terms associated with water supply.
2. List the four fundamental components of a modern water system.
3. Explain methods of moving water from municipal supply to distribution systems.
4. Explain the function of a processing or treatment facility and tell what the fire department’s main concern is regarding these facilities.
5. Label the parts of a water distribution system.
6. State recommended water distribution system pipe sizes for residential, business, industrial, and long mains.
7. Identify types of water main valves.
8. List causes of friction loss in water mains.
9. Distinguish between wet-barrel and dry-barrel fire hydrants.
10. Fully open and close a hydrant.
11. Make soft-sleeve and hard-suction hydrant connections.
12. Provide examples of alternative static water supply sources.
13. Select facts about water shuttling and relay pumping.
14. Deploy a portable water tank.
15. Connect & place a hard-suction hose from drafting from a static water source.

**COUPLING, LOADING, & ROLLING FIRE HOSE**

1. Match terms associated with a fire hoses to their definitions.
2. Match pumper hose sizes and types as required by NFPA 1901 to their correct applications.
3. Select the proper nozzle and hose for given fire attack situations.
4. Identify types of hose couplings.
5. Inspect hose couplings and replace a hose gasket.
6. Couple and uncouple hose.
7. List general guidelines for loading hose.
8. Identify hose loads and finishes.
9. Match hose loads to their advantages and disadvantages.
10. Load and unload the hose.
11. Identify hose rolls. Roll hose.

**LAYING, CARRYING, & ADVANCING FIRE HOSE**

1. Distinguish among descriptions of hose lays.
2. List basic safety guidelines for laying hose.
3. List the advantages and disadvantages of forward and reverse lays.
4. Make hydrant connections from forward and reverse lays.
5. Identify hose carries and drags.
6. Carry and drag hose.
7. List safety precautions for advancing lines to a fire.
8. Advance charged and uncharged lines.
9. Handle charged attack lines.
10. List methods of preventing mechanical, thermal, organic, and chemical hose damage.
11. Select facts about cleaning, inspecting, and storing hose.
12. Inspect, clean, and dry hose.

**WATER FIRE STREAMS**

1. Select facts about the properties & extinguishing capabilities of water.
2. List guidelines for reducing friction loss & preventing water hammer.
3. List discharge rates for low-volume, handline, and master streams.
4. Describe the advantages & disadvantages of handling solid & fog streams.
5. Select facts about water fire streams.
6. Identify types of nozzles.
7. Operate various fire hose nozzles.
8. Explain the operation of ball, slide, & rotary control nozzle valves.
9. List areas to check when maintaining and cleaning nozzles.

**FIRE CONTROL-CLASSES A, C, D, VEHICLE, & WILDLAND**

1. Select facts about suppressing Class A (structural) fires.
2. Distinguish among direct, indirect, & combination attacks on Class A fires.
3. Select facts about deploying and operating a master stream device.
4. Deploy and operate a master stream device.
5. Select facts about Class C fire control.
6. List safety guidelines for electrical emergencies.
7. Select facts about Class D fire control.
8. Select facts about company tactics for fire control.
9. Control and/or extinguish a Class A fire within a structure.
10. List guidelines for controlling passenger vehicle fires.
11. Identify hazards associated with controlling passenger vehicle fires.
12. Attack a passenger vehicle fire.
13. Extinguish a fire in a trash container.
14. Select facts about fires and emergencies in confined spaces.
15. Select facts about wildland fires.
16. Label the parts of a wildland fire.
17. List standard fire orders for wildland firefighting.
18. Analyze wildland fire scenarios.

**FIRE DETECTION, ALARM, & SUPPRESSION SYSTEMS-SPRINKLER SYSTEM FUNDAMENTALS**

1. Label the parts of a sprinkler head.
2. Identify automatic sprinkler head release mechanisms.
3. Describe pendant, upright, and sidewall sprinkler designs.
4. Manually stop the flow of water from a sprinkler head.
5. Identify the main control valve on an automatic sprinkler system.
6. Identify sprinkler system control valves.
7. Operate a sprinkler system control valve.
8. Select facts about a sprinkler system’s fire department connection.
9. Connect hoseline to a sprinkler system FDC.
10. Select guidelines for operations at sprinkler-protected properties.

**LOSS CONTROL--SALVAGE, OVERHAUL, & PROTECTING EVIDENCE OF FIRE CAUSE**

1. List the benefits of loss control to the public & the fire department.
2. State the purpose of salvage.
3. State the purposes of overhaul.
4. Select facts about salvage planning and procedures.
5. Select facts about salvage tools, equipment, and materials.
6. Fold and roll salvage covers.
7. Spread salvage covers from various folds and rolls.
8. Clean, inspect, and repair salvage covers.
9. Construct and splice water chutes.
10. Construct a catchall.
11. Cover or close building openings.
12. Match to their correct uses tools and equipment used in overhaul.
13. Select facts about overhaul safety and methods.
14. List the four basic methods of detecting hidden fires.
15. Select from a list of indicators of hidden fires.
16. Use an infrared scanner.
17. Pull a ceiling.
18. Remove debris and route water from a structure.

**PROTECTING EVIDENCE FOR FIRE CAUSE DETERMINATION**

1. Provide examples of information that should be noted/ reported en route or in the vicinity of the fire scene.
2. Provide examples of information that should be noted/ reported on arrival at the fire scene.
3. Provide examples of information that should be noted/ recorded during firefighting.
4. Select facts about preserving and protecting evidence during overhaul.

**FIRE DEPARTMENT COMMUNICATIONS-EQUIPMENT & TECHNIQUES**

1. Select facts about telecommunications center personnel.
2. Select facts about fire department telecommunications equipment.
3. Select from a list proper etiquette for receiving a non-emergency call.
4. List basic procedures for answering emergency calls.
5. Handle business calls and reports of emergencies.
6. Select facts about public alerting systems.
7. List procedures for reporting a fire/ emergency.
8. List methods of alerting fire department personnel.
9. List guidelines for proper two-way radio use and etiquette.
10. Analyze and correct two-way radio transmissions.
11. Role-play transmitting arrival and progress reports based on scenario information.
12. Select facts about tactical channels, emergency radio traffic, and evacuation signals.
13. Use prescribed fire department radio procedures.

**FIRE PREVENTION & PUBLIC FIRE EDUCATION**

1. Define the terms.
2. List types of fuel hazards and heat source hazards.
3. Distinguish among common fire hazards, special fire hazards, personal hazards, and target hazards.
4. List the main objectives of a residential fire safety survey.
5. Select from a list guidelines for conducting a residential fire safety survey.
6. List the most common causes of residential fires.
7. State aspects to check for interior residential survey concerns.
8. State aspects to check for outside residential survey concerns.
9. Conduct a residential fire safety survey.
10. Explain the main parts of a fire and life safety presentation.
11. Select facts about fire and life safety presentation topics.
12. Make and document a fire and life safety presentation.
13. Select facts about fire station tour procedures.
14. Conduct a fire station tour.

**HAZARDOUS MATERIALS**

1. Recognize and identify hazardous materials
2. Differentiate between hazardous materials incident and other emergencies
3. Identify decontamination techniques

**PHYSICAL FITNESS**

1. Discuss the benefits of a regular exercise program.
2. Explore exercise programs for warm-up, flexibility, strength, endurance and cardiovascular development.
3. Develop increased aerobic fitness, muscular strength and endurance, and improved agility & recovery.
4. Identify appropriate lifestyle modification techniques, including nutrition, stress reduction, adequate rest, and coping skills.
5. Discuss the psychological affect of mental fatigue
6. Perform proper lifting and carrying techniques with “Tools of the Trade”
7. Demonstrate proper cardio-respiratory control with use of an SCBA while under physical exertion
8. Demonstrate appropriate techniques for “CPAT” and traditional “Physical Agility” testing requirements

**CULTURAL DIVERSITY AND PERTINENT LAWS**

1. Cultures within the fire service and general population
2. Individual life experiences and their impact on attitudes and
3. behaviors
4. Define diversity
5. Equality in the workplace
6. Affirmative action
7. Discrimination and harassment laws and regulations
8. Hostile work environment and violence in the workplace
9. ADA – Americans with Disabilities Act
10. Teamwork – Methods to overcome hostile work environment
11. Verbal and non-verbal communications

**Instructional Strategies:**

* Lecture
* Group discussion
* Reading assignments
* Multimedia
* Hands-on practice
* Demonstration
* Teamwork
* Role-playing
* Small & large group activities
* Community observations
* Use of business partners as guest speaker

**Instructional Materials:**

EMR First On Scene, 10th edition, Bergeron, Le Baudour 2016

BLS for Healthcare Providers, American Heart Association, 2016

Fundamentals of Fire Fighter Skills, IAFC, NFPA 3rd Edition 2014

Diversity-The Impact of Perceptions CPF-CSFM-1995

**Articulation:**

Las Positas College – Livermore, CA

Chabot College – Hayward, CA

**Certifications:**

The following certifications are available for students:

* FEMA Tests:
* IS20 Diversity
* ICS 100 Incident Command
* IS-235 Emergency Planning
* IS-240 Leadership and Influence
* IS317 Community Response Team

**Certificate Competency List:**

* Students who complete and pass the written and skills testing for CPR will receive a certificate and CPR card active for 2 years from the American Heart Association.

Students receive FEMA certification upon completion of all assignments and exams.

**Fire Technology Competencies:**

* Describe basic fire department organizational structure & operating procedures
* Distinguish the duties and functions of fire department personnel
* Follow basic fire station, apparatus, and tool safety procedures and guidelines
* Predict probable fire behaviors & know the actions necessary to change or prevent these behaviors
* Identify structural characteristics of building types & recognize signs & causes of potential building collapse
* Don and doff protective clothing and use a PASS device
* Safely use, clean, refill, inspect, and store SCBA
* Identify & use portable fire extinguishers to extinguish small Class A, Class B, & Class C fires
* Identify and properly know, use, & maintain various types of rope used in the fire service
* Conduct a search & rescue in a structure operating as a member of a team
* Identify & know appropriate applications & maintenance procedures for forcible entry tools
* Recognize various types of construction components & use appropriate forcible entry techniques
* Identify, carry, raise, climb, inspect, and maintain fire service ground ladders
* Apply the principles of ventilation to appropriately ventilate a building
* Describe the fundamentals of a water supply system & be able to connect a fire department pumper to various water sources
* Couple, load, and roll hose
* Make hydrant connections from various lays and be able to carry drag, advance, and handle both charged and uncharged hoselines
* Identify and operate a given selection of nozzles and tips for water fire streams
* Operate as a part of a team to control and/or extinguish interior and exterior Classes A, C, and D fires and passenger vehicle and wildland fires
* Perform basic operations at properties protected by automatic sprinklers
* Safely and efficiently perform salvage and overhaul at a fire scene while protecting evidence for fire cause determination
* Identify & properly use various fire service communications systems & equipment
* Identify residential fire hazards, conduct a fire station four & a residential fire safety survey, & make & document a fire and life safety presentation

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