

CATALOG INFORMATION

Dept and Nbr: FIRE 258

Title: PUMPING APPARATUS OPS

Full Title: Fire Apparatus 1B, Pumping Apparatus Operations

Last Reviewed: 2/26/2024

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	1.00	Lecture Scheduled	1.75	5	Lecture Scheduled	8.75
Minimum	1.00	Lab Scheduled	6.25	2	Lab Scheduled	31.25
		Contact DHR	0		Contact DHR	0
		Contact Total	8.00		Contact Total	40.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 17.50

Total Student Learning Hours: 57.50

Title 5 Category: AA Degree Applicable

Grading: P/NP Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly: FIRE299.63

**Catalog Description:**  
Students will learn about pumping apparatus, preventive maintenance, and operations. Topics include routine tests, inspections and servicing functions, producing hand, master and foam fire streams, relay pump operations and supplying water to sprinkler and standpipe systems. This course is based on National Fire Protection Administration (NFPA) 1002 Standard for Fire Apparatus Driver/Operator Professional Qualifications. Upon successful completion, students will be awarded a completion certificate from the State Board of Fire Services.

**Prerequisites/Corequisites:**

**Recommended Preparation:**  
Course Completion of FIRE 71 or equivalent

**Limits on Enrollment:**  
Must have a valid Class C California State Driver's license and completion of Office of the State Fire Marshal Firefighter I and Driver Operator IA training as determined by the Dean of Public Safety Instruction.

**Schedule of Classes Information:**  
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Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU GE:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>IGETC:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>
<b>UC Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Describe the different types of fire pumps, their components, the concepts of pump operations, maintenance procedures and hydraulic calculations used for friction loss.
2. Demonstrate the ability to operate a pump on a fire apparatus to produce a variety of hose and foam streams as well as support other fire apparatus and built-in fire protection systems.

### **Objectives:**

At the conclusion of this course, the student should be able to:

1. Identify the facility, classroom, and course requirements
2. Describe the State Fire Training Fire Apparatus Driver/Operator Pump Apparatus Certification process
3. Demonstrate the ability to perform routine inspections, tests, and service functions on a pumping apparatus
4. Demonstrate the ability to produce an effective hand and master stream through the proper use of a pumping apparatus
5. Demonstrate the ability to pump a supply line to provide the correct pressure and flow to another apparatus in a relay operation
6. Demonstrate the ability to produce foam fire streams at properly proportioned ratios

7. Demonstrate the ability to supply water to standpipe and sprinkler systems at the correct flow and pressure

## **Topics and Scope:**

### **I. Identify Course Requirements**

- A. Facility requirements
- B. Classroom requirements
- C. Course requirements and syllabus

### **II. Fire Apparatus Driver/Operator Pump Apparatus Certification Process**

- A. Courses required for Fire Apparatus Driver/Operator-Pumping Apparatus certification
  - 1. Fire Apparatus Driver/Operator 1A: Driver Operator
  - 2. Fire Apparatus Driver/Operator 1B: Pumping Apparatus Operations
- B. Other Fire Apparatus Driver/Operator-Pumping Apparatus certification requirements

- 1. SFM Firefighter I
  - 2. One year full-time paid or two years volunteer experience in a California fire department

as a pumping apparatus driver/operator

- 3. Be appointed to the position of Fire Apparatus Driver/Operator

C. The Certification Task Book process

D. The Certification Testing process

### **III. Performing Routine Tests, Inspections and Servicing Functions Unique to Pumping Apparatus**

- A. Manufacturer's specifications and requirements
- B. Agency's policies and procedures including documentation requirements
- C. Pumping system components

- 1. Pump types
    - a. Positive displacement
    - b. Centrifugal
    - c. Single/multi-stage
  - 2. Transfer of power
  - 3. Priming systems
  - 4. Pumping systems
  - 5. Foam systems
  - 6. Pressure control devices
  - 7. Gauges
  - 8. Valves and plumbing
  - 9. Water tank and other extinguishing agent levels
    - a. Steel tanks
    - b. Aluminum tanks
    - c. Poly tanks

D. Use tools and equipment

E. Inspecting fire pumps and their components

F. Recognizing system problems

G. Correcting deficiencies according to policies and procedures and/or manufacturer's specifications

### **IV. Effective Hand and Master Streams**

- A. Hydraulic calculations for friction loss and flows using formulas and estimations
- B. Pump discharge pressure calculations
- C. Proper positioning of apparatus for different applications
  - 1. Hydrants
  - 2. Standpipes
  - 3. Drafting

- D. Safe pump operation
  - 1. Introduction of water
  - 2. Cavitation
  - 3. Water hammer
  - 4. Overheating
  - 5. Discharge gates
  - 6. Pressure control devices
- E. Problems related to small diameter and dead-end mains
- F. Low pressure and private water supply systems
- G. Hydrant coding systems
- H. Principles of drafting
- I. Reliability of static water sources
- J. Apparatus positioning for hydrants and static water sources
- K. Transferring power from the engine to pump
- L. Drafting
- M. Operating pump pressure control systems
- N. Operating multi-stage pump transfer valves
- O. Operating auxiliary cooling systems
- P. Transferring from and internal to an external water supply
- Q. Assembling hose lines, nozzles, valves, and appliances
- R. Use of hydraulic calculations to produce effective streams
- V. Relay Pumping Operations
  - A. Need for relay pump operations
  - B. Hydraulic calculations for friction loss and flows using formulas and estimations
  - C. Pump discharge pressure calculations
  - D. Apparatus positioning for hydrants and static water sources
  - E. Transferring power from the engine to pump
  - F. Draft
  - G. Operating pump pressure control systems
  - H. Operating multi-stage pump transfer valves
  - I. Operating auxiliary cooling systems
  - J. Transferring from and internal to an external water supply
  - K. Assembling hose lines, nozzles, valves, and appliances
  - L. Use of hydraulic calculations in relay operations
- VI. Producing Foam Fire Streams
  - A. Proportioning rates and concentrations
  - B. Foam making equipment and assembly procedures
  - C. Foam system limitations
  - D. Manufacturer's specifications and requirements
  - E. Operating foam proportioning equipment
  - F. Connecting foam stream equipment
- VII. Supplying Water to Fire Sprinkler Systems and Standpipes
  - A. Hydraulic calculations for friction loss and flows using formulas and estimations
  - B. Pump discharge pressure calculations
  - C. Hose layouts
  - D. Locations of fire department connections
  - E. Alternate supply procedures for fire department connections
  - F. Sprinkler system operating principles per NFPA 13
  - G. Fire department operations in sprinklered building per NFPA 13
  - H. Standpipe system operating principles per NFPA 14
  - I. Positioning apparatus to operate at a fire hydrant
  - J. Transferring power from the engine to pump

- K. Operating pumper pressure control systems
  - L. Operating multi-stage pump transfer valves
  - M. Operating auxiliary cooling systems
  - N. Transferring from and internal to an external water supply
  - O. Assembling hose lines, nozzles, valves, and appliances
  - P. Applying hydraulic calculations to sprinkler and standpipe systems
- All topics are covered in both the lecture and lab parts of the course.

## Assignment:

### Lecture-Related Assignments:

1. Quiz(zes) (1-3) and summative exam

### Lab-Related Assignments:

1. Perform inspections and operation of an apparatus fire pump
2. Prepare pump diagram schematic drawings
3. Prepare hydraulic calculations for the friction loss associated with pumping operations
4. Demonstrate the ability to produce an effective fire stream
5. Demonstrate the ability to produce an effective foam fire stream
6. Demonstrate the ability to conduct a relay pump operation
7. Demonstrate the ability to properly support standpipe and fire sprinkler systems

## Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Completion of diagrams of a variety of fire pumps and their components

Writing  
5 - 10%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Hydraulic calculation; Operation of a fire pump to create an effective fire and foam stream and support a relay pump operation, standpipe and fire sprinkler system

Problem solving  
20 - 40%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Fire pump inspection and operation

Skill Demonstrations  
20 - 40%

**Exams:** All forms of formal testing, other than skill performance exams.

Quiz(zes) and summative exam

Exams  
20 - 40%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None
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Other Category 0 - 0%
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**Representative Textbooks and Materials:**

Pumping Apparatus Driver/Operator Handbook. 3rd ed. International Fire Service Training Association. 2015 (classic).

Fire Apparatus Driver/Operator. 2nd ed. Jones and Bartlett. 2016 (classic).

California State Fire Training Student Supplement. 2015 (classic).

California Commercial Driver handbook, DMV, current edition.

Instructor prepared materials