Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by:	Crystal Nasio	**Date:**	03/14/2019

Department	Subject	Course Number	Title
Fire Technology	Fire Technology FIRE	107	Fire Apparatus and Equipment

Units/Hours

Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
Each laboratory unit requires 3 hours per week of class time.
Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units	Total Units
3.00	3.00

Lecture Contact Hours	Total Contact Hours
48.00 - 54.00	48.00 - 54.00

Lecture Homework Hours
96.00 - 108.00

Stand Alone:

Program Applicable

AA/AS Degree General Ed Breadth Area(s):

-none-

General Education Justification:

Maximum Enrollment:	40
Maximum Enrollment Justification:	Course requires significant individualized instruction or assessment â€“ check all that apply: * Course relies on small group dynamics as a means of instruction or assessment.

	Justification: hands on skills are accomplished in small group settings and must be monitored.
Grading Method:	**Letter Grade or P/NP**
TOP code:	**2133.00***

Can be Taken 1 **time(s) for credit** (max 4)

- [ ] - Visual or Performing Arts course that is required to meet major requirements for UC/CSU
- [ ] - Intercollegiate athletics course
- [ ] - Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course). (**75 words** or less in gray box below).

This course introduces the student to the Driver/Operator job position in the fire service. This course will analyze fire apparatus design, specifications and performance capabilities; effective utilization of apparatus in fire service emergencies. This course will allow students to solve hydraulics calculations and examine the physical characteristics of water and water supply systems.

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course). (**25 words** or less in gray box below).

This course prepares the student to analyze fire apparatus design, specifications and performance capabilities. The student will examine hydraulic principles and water supply systems.

Need for the course:

This course provides a fundamental knowledge of fire apparatus and equipment. This course will be added to the Fire Apparatus Operator certificate in conjunction with it's reactivation.

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details.
(For further clarification, contact the Prerequisite Subcommittee)

-none-

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.

-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.

-none-

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)

Upon the completion of the course the student will be able to do the following:

1. Compare and contrast the differences in design and purpose for each type of apparatus.
2. Assess the importance of defensive driving when operating emergency vehicles code three.
3. Analyze the proper positioning of fire apparatus at the scene of an emergency.
4. Compare and contrast the physical properties of water.
5. Distinguish the relationship of flow, pressure, shape, and nozzle reaction in the design and operation of a nozzle.
6. Differentiate between density, weight, and pressure.
7. Contrast the different types of pressures.
8. Diagram the operating principles of positive displacement and dynamic pumps.
9. Explain basic pump procedures such as engaging the pump and operating associated valves and controls.
10. Examine the unique considerations for using each of the five water supply sources.
11. Describe how water tanker shuttle operations can be effective in rural communities.
12. Evaluate the foam types and their application on assorted fuel types.

Course Content:

(please number the outline of main topics and subtopics)

1. The Driver/Operator
    1. Skill and Physical abilities
    2. Selection of Driver/Operators
    3. Driving regulations
2. Types of fire apparatus equipped with a fire pump.
    1. Fire department Pumpers
    2. Pumper types
    3. Mobile water supply
3. Introduction to apparatus inspection and maintenance
    1. a systematic maintenance program
    2. Apparatus inspection procedures
    3. Charging batteries
    4. General fire suppression equipment maintenance
4. Operating emergency vehicles
    1. Collision statistics and causes
    2. Driving regulations
    3. Starting and driving the vehicle
    4. Safe driving techniques
    5. Traffic control devices
    6. Driving exercises and evaluation methods
    7. Summary of good driving practices
5. POSITIONING APPARATUS
    1. Positioning fire department pumpers
    2. Positioning wildland fire apparatus
    3. Positioning support apparatus
    4. Special positioning situations
6. WHAT IS WATER AND WHERE DOES IT COME FROM?
    1. Characteristics of water
    2. Extinguishing properties of water
    3. Advantages and disadvantages of water
    4. Water pressure and velocity
    5. Types of pressure
    6. Friction loss
    7. Principles of municipal water supply systems

8. Private water supply system

7. FIRE HOSE NOZZLES AND FLOW RATES
    1. Fire hose nozzles
    2. Selecting nozzles
    3. Nozzle pressure and reaction
8. THEORETICAL PRESSURE CALCULATIONS
    1. Total pressure loss
    2. Hose layout applications
    3. Determining pump discharge pressure
9. FIRE GROUND HYDRAULIC CALCULATIONS
    1. Flow meters
    2. Hydraulic calculations
    3. Pump charts
    4. Condensed “Q” formula
    5. GPM flowing
10. FIRE PUMP THEORY
    1. Positive displacement pumps
    2. Centrifugal pumps
    3. Pump piping and valves
    4. Automatic pressure control devices
    5. Priming methods and devices
    6. Pump panel instrumentation
    7. Auxiliary cooling devices
11. OPERATING FIRE PUMPS
    1. Making the pump operational
    2. Operating from the water tank
    3. Operating from a pressurized water supply source
    4. Operating from a static water supply source
    5. Sprinkler and standpipe support
12. STATIC WATER SUPPLY SOURCES
    1. Principles of lift
    2. Natural static water supply sources
    3. Man-made static water supply sources
13. RELAY PUMPING OPERATIONS
    1. Relay apparatus and equipment
    2. Relay pumping operational considerations
    3. Types of relay pumping operations
    4. General guidelines for relay operations
14. WATER SHUTTLE OPERATIONS
    1. Water shuttle apparatus
    2. Setting up a water shuttle
    3. Fill site operations
    4. Dump site operations
    5. Evaluating tender performance
15. FOAM EQUIPMENT AND SYSTEMS
    1. Principles of foam
    2. Foam concentrates
    3. Low foam proportioning systems
    4. High-energy foam generating systems
    5. Assembling a foam fire system
    6. Foam application techniques
16. APPARATUS TESTING
    1. Pre-service tests
    2. Pumper service tests

3. Foam proportioning equipment testing

Methods of Instruction:

Methods of instruction may include, but are not limited to the following:

- **Method:** Lecture
  Integration: Lecture presentation and classroom discussion on current principles and practices of fire ground hydraulics and pumping apparatus will be utilized.
- **Method:** Role Playing/Simulation
  Integration: Participation in problem solving activities, demonstrations, and simulated exercises will be used to enhance the learning process by using/seeing in-service Fire Apparatus.
- **Method:** In-class Exercises
  Integration: Hands on activities will be used to illustrate physical characteristics of water and pump theory.
- **Method:** Activity
  Integration: Hands on activities will be used to demonstrate fire apparatus configurations.
- **Method:** Observation and Demonstration
  Integration: PowerPoint slides, and other forms of media, will be used to enhance and illustrate class activities, exercises, and other appropriate information relative to fire apparatus and equipment.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Exams/Tests
  Integration: A midterm and final examination will be given to test for content understanding of terminology, knowledge of subject matter, and ability to contrast and evaluate hydraulic principles and pump construction.
- **Method:** Homework
  Integration: Written assessments will be used to demonstrating an ability to differentiate the types of fire apparatus and pump operations; the advantages and disadvantages of the five water supply sources; and their diagram of the operating principles of positive displacement and dynamic pumps.
- **Method:** Class Performance
  Integration: Problem solving activities, lab demonstrations, and simulated exercises will be performance based and graded against industry standards for operating Fire Apparatus.

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

1. Differentiate the types of fire apparatus in the modern fire service and demonstrate this through written format.
2. Compare and contrast pump operating principles and construction and demonstrate this through written format.
3. Diagram the operating principles of positive displacement and dynamic pumps.
4. Describe the relationship of flow, pressure, shape, and nozzle reaction in the design and operation of a nozzle and demonstrate this through written format.
5. Through written assignment demonstrate an ability to differentiate the types of fire apparatus and pump operations; analyze the advantages and disadvantages between the five water supply sources; and diagram the operating principles of positive displacement and dynamic pumps.
6. During driving simulation, formulate code three driving specifications and apply the vehicle code to distinguish safe driving habits.

Textbooks:

- International Association of Fire Chiefs (2018). *Fire Apparatus Driver/Operator:Pump, Aerial, Tiller, and Mobile Water Supply* Jones & Bartlett Learning. ISBN: 978-1284147612
- Goodson, C. (2016). *Pumping Apparatus Driver/Operator Handbook, ed.* IFSTA. ISBN: 9780134027081

Other Resources:

Minimum Qualification

- Fire Technology