Name:	***Fire Protection Hydraulics and Water Supply***
Course Description:	This course provides a foundation of theoretical knowledge in order to understand the principles of the use of water in fire protection and to apply hydraulic principles to analyze and to solve water supply problems.
Prerequisite:	Demonstration of a competency in high school level algebra or the equivalent.
Outcomes:	1. Apply the application of mathematics and physics to the movement of water in fire suppression activities. 2. Comprehend the design principles of fire service pumping apparatus. 3. Analyze community fire flow demand criteria. 4. Demonstrate, through problem solving, a thorough understanding of the principles of forces that affect water at rest and in motion.
Available Texts:	*Fire Protection Hydraulics and Water Supply Analysis*; Pat Brock, Fire Protection Publications, 2005 *Fire Protection Handbook;* NFPA *Fire Service Hydraulics and Water Supply*; Mike Wieder, IFSTA/Fire Protection Publications, 2004 *Introduction to Fire Pumps*; Thomas Sturtevant, Thomson, 2004
Supporting References/Research for Faculty and Students:	**U.S. Fire Administration** Publications: http://www.usfa.fema.gov/applications/publications/pubs_main.cfm See Fire Protection, Fire Administration, Fire Service Operations, Wildfire Applied Research: http://www.usfa.fema.gov/dhtml/inside-usfa/research.cfm Research Reports: http://www.usfa.fema.gov/dhtml/inside-usfa/r_reports.cfm Technical Reports: http://www.usfa.fema.gov/applications/publications/techreps.cfm Topical Fire Research Series: http://www.usfa.fema.gov/dhtml/inside-usfa/tfrs.cfm Learning Resource Center: http://www.usfa.fema.gov/dhtml/inside-usfa/lrc.cfm **National Institute for Standards and Technology** http://www.fire.nist.gov: Fire Tests/Data, Software/Models, Publications, FIREDOC (under Publications) **References** *Fire Service Hydraulics*; James Casey, Pennwell, 2nd.Ed. 1984 *Fire Service Pump Operators Handbook*; Warren Isman, Pennwell 1984

	Hydraulics for Firefighting; William Crapo, Thomson, 2001 *Pumping Apparatus: Driver/Operator Handbook*; Fire Protection Publications, 1998 *Techniques of Fire Hydraulics*; Lawrence Erven, Glencoe Fire Service Series, 1972
Supporting References/Research for Faculty and Students:	**Current Events/News** http://www.firehouse.com/ http://www.fireengineering.com/ http://www.withthecommand.com/
Assessment:	Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.
Points of Contact:	Terry Koeper, Crafton Hills College, California (909) 389-3261, tkoeper@craftonhills.edu

Course Outline

Fire Protection Hydraulics and Water Supply

I. Water as an extinguishing agent

- A. Physical properties
- B. Terms and definitions

II. Math review

- A. Fractions
- B. Ratios, proportions, and percentage
- C. Powers and roots

III. Water at rest

- A. Basic principles of hydrostatics
  1. Pressure and force
  2. Six principles of fluid pressure
  3. Pressure as a function of height and density
  4. Atmospheric pressure
- B. Measuring devices for static pressure

IV. Water in motion

- A. Basic principles of hydrokinetics
- B. Measuring devices for measuring flow
- C. Relationship of discharge velocity, orifice size, and flow

V. Water distribution systems

- A. Water sources
- B. Public water distribution systems
- C. Private water distribution systems
- D. Friction loss in piping systems
- E. Fire hydrants and flow testing

VI. Fire Pumps

- A. Pump theory
- B. Pump classifications
- C. Priming systems
- D. Pump capacity
- E. Pump gauges and control devices
- F. Testing fire pumps

VII. Fire streams

A. Calculating fire flow requirements
B. Effective horizontal and vertical reach
C. Appliances for nozzles
D. Performance of smooth-bore and combination nozzles
E. Hand-held lines
F. Master streams
G. Nozzle pressures and reaction
H. Water hammer and cavitations

VIII. Friction loss

A. Factors affecting friction loss
B. Maximum efficient flow in fire hose
C. Calculating friction loss in fire hose
D. Friction loss in appliances
E. Reducing friction loss

IX. Engine pressures

A. Factors affecting engine pressure

X. Standpipe and sprinkler systems

A. Standpipe systems
    1. Classifications
    2. Components
    3. Supplying Standpipe Systems

B. Sprinkler systems
    1. Classifications
    2. Components
    3. Supplying sprinkler systems