

**Course Outline**

**COURSE:** WTRM 232                      **DIVISION:** 50                      **ALSO LISTED AS:** WTRM 132

**TERM EFFECTIVE:** Spring 2019                      **CURRICULUM APPROVAL DATE:** 11/13/18

**SHORT TITLE:** ADV WATER DISTRIBUTION

**LONG TITLE:** Advanced Water Distribution

Units	Number of Weeks		Contact Hours/Week		Total Contact Hours
3	18	Lecture:	3	Lecture:	54
		Lab:	0	Lab:	0
		Other:	0	Other:	0
		Total:	3	Total:	54

**COURSE DESCRIPTION:**

This advanced level course prepares students for work in a highly skilled or supervisory position in the operation of a water distribution system. It prepares the student to take the State of California Water Distribution Operator exam at D3, D4, and D5 levels. This course was previously listed as WTRM 132. **ADVISORY:** WTRM 202 Beginning Water/Wastewater Mathematics, WTRM 205 Water Distribution 1, WTRM 208 Water Distribution 2.

**PREREQUISITES:**

**COREQUISITES:**

**CREDIT STATUS:** D - Credit - Degree Applicable

**GRADING MODES**

L - Standard Letter Grade

**REPEATABILITY:** N - Course may not be repeated

**SCHEDULE TYPES:**

02 - Lecture and/or discussion

05 - Hybrid

72 - Dist. Ed Internet Delayed

**STUDENT LEARNING OUTCOMES:**

1. Interpret public health standards applicable to water supply.

Measure of assessment: Written Exams, Homework

Year assessed, or planned year of assessment: 2017

Semester: Fall

2. Discuss the principals of management, organization and leadership techniques.

Measure of assessment: Written Exams, Discussions, Homework

Year assessed, or planned year of assessment: 2017

Semester: Fall

3. Demonstrate the ability to meet the written test standards for the D3, D4, and D5 level State of California water distribution operator exams.

Measure of assessment: Quizzes, Exams, Worksheets

Year assessed, or planned year of assessment: 2017

## **CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS**

Curriculum Approval Date: 11/13/18

3 Hours

Content: Public Health - In-depth exploration and applications of: public health aspects of water supply; drinking water standards; cross connection control and backflow prevention.

Student Performance Objectives: Interpret and analyze public health standards applicable to water supply including drinking water standards, cross connection control and back flow prevention.

3 Hours

Content: Sources of Water and Characteristics - Knowledge and applications of: distinct sources of surface water, groundwater and reclamation product; physical, chemical and biological characteristics of each type.

Student Performance Objectives: Distinguish and evaluate sources and characteristics of available water and their uses and applications.

3 Hours

Content: Water Production, Storage and Distribution - Comprehensive water treatment processes and plant operations; storage reservoirs and tanks; distinct types of distribution systems; testing, monitoring and maintaining water quality in distribution systems. Field trip to the campus' water storage tanks.

Student Performance Objectives: Compare and contrast different types of water distribution systems. Interpret and synthesize drinking water public health hazards and water quality standards. Describe in detail testing and monitoring standards and processes and procedures for maintaining water quality in distribution systems.

6 Hours

Content: Mathematics and Hydraulics - Advanced calculations and conversions relating to: chemical dosages; hydrostatics; flow rates, volumes and measurements; pump rates, head and efficiency.

Student Performance Objectives: Formulate and perform higher order mathematical calculations and conversions relating to water flow, pressure, volume, velocity, force, chlorine dosage and meter accuracy. Perform mathematical problems relating to the ability to calculate: the cost of water production, the cost of pumping water, estimating future water needs, the hydraulic gradient, water production costs, a water loss rate and annual expenditures. Perform complex mathematical calculations and conversions relating to volumes, flow rates, velocities, pressure, hydrostatic force, chlorine dosage and meter accuracy.

3 Hours

Content: Disinfection - Advanced knowledge and applications of: chlorine properties and use; chlorine reactions with various compounds; chlorine safety; breakpoint chlorination; disinfectants other than chlorine.

Student Performance Objectives: Identify and assess the proper method to disinfect pipe. Analyze and evaluate the mechanics and operations of chlorine delivery systems and safely perform chlorine related procedures. Discuss the safe handling of chlorine. Explain how to properly collect water samples from water distribution systems and test for chlorine residual.

3 Hours

Content: Pipelines - Pipeline concepts and principles: construction and materials; installation, protection and maintenance; applications and uses.

Student Performance Objectives: Identify and assess the proper methods to select, handle, install, repair and maintain pipe. Assess factors considered in the selection of pipe.

3 Hours

Content: Pipeline Appurtenances - Specific types of valves - blow-offs and air valves; applications for installation and maintenance; purposes and functions.

Student Performance Objectives: State the uses of water utility valves. Identify the various types of valves and describe their purpose. Discuss the importance of maintaining accurate valve records.

3 Hours

Content: Meters and Services - Specific types of meters and materials; methods and practices in installation; maintenance and uses.

Student Performance Objectives: Assess factors considered in the selection of pipe including the ability to read meters and calculate their accuracy. Name the different types of meters and explain their practical applications.

3 Hours

Content: Pumps and Motors - Advanced pumping terminology, pumping principles, types and uses of pumps; applied interpretation of pump curves, motors, voltage power and efficiency; installation and maintenance.

Student Performance Objectives: Formulate pump functions and operations. Explain pumping operations and identify and assess common pump problems, including control systems and SCADA systems. Adjust and repack packing glands. Perform routine maintenance of pumps and motors.

3 Hours

Content: Electrical/Instrumentation - Advanced terminology, types of control systems, sensing and sampling devices; specific types of electronic signals, readout devices and remote control systems; SCADA systems, signal transmission and calibration; data transmission methods and systems.

Student Performance Objectives: Utilize advanced electrical terms. Evaluate control circuits, sensing equipment and SCADA systems. Discuss data transmission methods and systems.

3 Hours

Content: Safety - Applied principles of trenching and shoring, pipe construction, working in confined spaces and working around construction equipment; familiarity with safety regulations - SDS documentation (HazCom Regulations), OSHA regulations.

Student Performance Objectives: Conduct any required demonstration work safely by adhering to safety regulations and safe work practices. Explain the OSHA reporting requirements. Recognize safety hazards, safety regulations and safe work practices including the principles of emergency response planning, operations, hazards and vulnerability assessment of water distributions systems and facilities. Develop a safety plan.

3 Hours

Content: Maps, Drawings and Records - Synthesis, analysis and interpretation of commonly used symbols, conventions and terminology used with various types of maps and construction drawings; record keeping of as-built drawings, map ties, water production and maintenance records.

Student Performance Objectives: Interpret and analyze complex water distribution system maps, drawings, records and as-built drawings. Develop, maintain and interpret accurate water production and maintenance records. Explain the reason for maintaining thorough records.

3 Hours

Content: Water System Operations - Daily operating procedures, monitoring process information, regulation of flows; chemical use and handling operating records and reports; emergency conditions and procedures.

Student Performance Objectives: Name the types of water systems. List the common elements associated with water supply systems. Discuss the two major objectives for drinking water distribution systems - maintaining water quality and maintaining adequate pressure/flow. Discuss the safety precautions for system operation and maintenance work.

3 Hours

Content: Management and Leadership Skills - General principals of organization; administration; communication and leadership.

Student Performance Objectives: Discuss the general principles of management, organization and leadership techniques as they relate to the water/wastewater industry.

3 Hours

Content: Emergency Response Planning and Operations - General principles of hazard assessment and vulnerability analysis; Standardized Emergency Management System (SEMS).

Student Performance Objectives: Explain the general principles of emergency response planning and operations and the hazard and vulnerability assessment of water distributions systems and facilities. Describe SEMS.

4 Hours

Content: Public Relations - Assessment and response to water quality complaints; interpretation and evaluation of water quality standards violations; communications and dealing with the media; standards for public notification and dealing with the public. Review the Water Distribution Exams Expected Range of Knowledge, the application process and the type of exam questions.

Student Performance Objectives: State the role of public relations as it relates to the water industry and the role of water distribution personnel. Discuss the application process for the water distribution exams.

2 Hours

### **METHODS OF INSTRUCTION:**

lectures, discussions, multimedia presentations, guest speakers, field trips

### **OUT OF CLASS ASSIGNMENTS:**

Required Outside Hours: 30

Assignment Description: Read related textbook chapter. Review notes and complete study guide questions.

Required Outside Hours: 36

Assignment Description: Study for quizzes and midterm and final exams. Complete sample water distribution exams for Grade D3, D4, and D5.

Required Outside Hours: 42

Assignment Description: Homework: Such as - Complete take home math problem sets. and/or Explore the campus and investigate the various types of valves/valve assembly systems utilized. Come prepared to discuss your findings with the class. and/or Determine the type of meter that is on your personal water service and come prepared to discuss with the class. and/or Field trip to a local pump station. Write a 1-2 page paper on your experience. and/or Put together a sample safety plan. and/or Prepare an as-built. and/or Interview a water utility management staff member about their emergency response plan and come prepared to discuss the information in class.

### **METHODS OF EVALUATION:**

Writing assignments

Percent of total grade: 20.00 %

Percent range of total grade: 10% to 30 % Written Homework

Problem-solving assignments

Percent of total grade: 30.00 %

Percent range of total grade: 20% to 40% Homework Problems, Quizzes

Objective examinations

Percent of total grade: 40.00 %

Percent range of total grade: 40% to 60% Multiple Choice, Other: Math - Show Work

Other methods of evaluation

Percent of total grade: 10.00 %

0% - 20% Student Participation

### **REPRESENTATIVE TEXTBOOKS:**

Required Representative Textbooks

Mays, Larry W. Water Transmission and Distribution (Fourth Edition). Denver, CO: American Water Works Association, 2010.

This text is an important industry standard text and is the most current edition available. Once a newer edition is published it will be adopted.

Reading Level of Text, Grade: 12th Grade Verified by: MS Word

#### **ARTICULATION and CERTIFICATE INFORMATION**

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Not Transferable

UC TRANSFER:

Not Transferable

#### **SUPPLEMENTAL DATA:**

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department:

CSU Crosswalk Course Number:

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: C

Maximum Hours: 3

Minimum Hours: 3

Course Control Number: CCC000588883

Sports/Physical Education Course: N

Taxonomy of Program: 095800