

CATALOG INFORMATION

Dept and Nbr: WTR 110

Title: WATER TRTMNT PLNT OPERAT

Full Title: Water Treatment Plant Operator

Last Reviewed: 2/13/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	17.5	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

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

Also Listed As:

Formerly: ENVT 110

**Catalog Description:**  
This course provides training in the knowledge and skills required to safely operate public drinking water treatment facilities. It assists students in preparation for operator certification examinations required by the State of California. It is designed for those students who wish to become water treatment plant operators and those operators who wish to upgrade their certification grade level.

**Prerequisites/Corequisites:**  
Course Completion of WTR 102 ( or ENVT 102 or ENVT 200.2)

**Recommended Preparation:**

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: Provides training in knowledge and skills required to safely operate public drinking water treatment facilities. Preparation for operator certification examinations required by the State of California. For students who wish to become water treatment plant operators and operators who wish to upgrade their certification grade level. (Grade Only)

Prerequisites/Corequisites: Course Completion of WTR 102 ( or ENVT 102 or ENVT 200.2)

Recommended:

Limits on Enrollment:

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:**

Certificate Applicable Course

## **COURSE CONTENT**

### **Outcomes and Objectives:**

In a drinking water treatment facility setting, the student will be able to:

1. Discuss issues related to watersheds and watershed protection.
2. Measure and evaluate raw and treated water quality.
3. Execute water treatment processes to produce drinking water that meets established water quality parameters.
4. Operate and maintain a drinking water treatment facility and all its components while ensuring operator safety.
5. Conduct appropriate laboratory procedures to ensure drinking water quality.
6. Interpret and apply the Safe Drinking Water Act and other safe drinking water regulations and standards.
7. Follow industry recordkeeping procedures and maintain all required records.

### **Topics and Scope:**

#### **I. Water Quality and Sources**

##### **A. Introduction to water quality**

1. Public health and consumer acceptance of water quality
2. The Safe Drinking Water Act
3. Sources of contaminants
4. Common contaminants
5. Units of measure
6. Introduction to treatment technologies
7. Physical methods
8. Chemical methods

##### **B. Sources**

1. Surface water and reservoir

2. The Surface Water Treatment Rule
  3. Streams and rivers
  4. Reservoirs
  5. Watersheds and water shed protection
  6. Types of contaminants
  7. Double barrier treatment
  8. Groundwater sources
  9. Wells and well field operations
  10. Types of contaminants
  11. Source water assessment
  12. Source water monitoring
- II. Water Treatment Processes
- A. Water treatment and processes for particulate reduction
1. Conventional water treatment
    - a. Coagulation, flocculation, sedimentation, filtration
    - b. Direct filtration
  2. Slow sand & diatomaceous earth filtration
  3. Membranes processes: micro and ultrafiltration
  4. Flow calculations: filtration rate, backwash rate, overflow rate
- B. Water treatment and processes for non-particulate contaminant reduction
1. Chemistry of dissolved contaminants
  2. Common dissolved contaminants
  3. Common treatment processes
- C. Disinfection
1. Making water safe to drink
  2. Factors influencing effectiveness of disinfection
  3. Processes
    - a. Chlorination
    - b. Ultraviolet irradiation
    - c. Ozonation
  4. Chlorination
    - a. Chlorine dose, demand, and residual
    - b. Free and combined chlorine
    - c. Breakpoint chlorination
    - d. Chloramination
    - e. Disinfection inactivation calculations and values
    - f. Forms of available chlorine
  5. Disinfection byproducts
- D. Corrosion and corrosion control
1. The corrosion process
  2. Chemical and physical factors influencing corrosion
  3. Methods of control
    - a. Materials of construction
    - b. Water treatment
- E. Fluoridation
1. Purpose of fluoridation
  2. Methods
- III. Operations and Maintenance
- A. Chemical feed
1. Common chemicals for water treatment
  2. Chemical feed pumps - types and controls
  3. Solution mixing and calculation

- 4. Dosage calculations
- B. Pumps and motors
  - 1. Centrifugal pump operation and performance measurement
  - 2. Electrical controls
  - 3. Maintenance duties
- C. Pressure and flow measurement
  - 1. Head calculations
  - 2. PSI calculations
- D. Safety
  - 1. Confined space regulations, lockout/tagout procedures, MSDS "right to know" programs and regulations
  - 2. Safety programs in the workplace
  - 3. Division of safety responsibility between employer and employee
- E. Supervisory Control and Data Acquisition (SCADA)
  - 1. Types and purpose of instrumentation and control
  - 2. Primary sensors
  - 3. Telemetry and display
  - 4. Control system
- IV. Laboratory Procedure and/or Demonstration
  - A. Sampling techniques
    - 1. Chemical and physical parameter sampling
    - 2. Bacteriological sampling
    - 3. Transport
  - B. Basic laboratory procedures
    - 1. Jar testing
    - 2. Turbidity measurement
    - 3. Titration & drop count measurements
    - 4. Color comparison devices
  - C. Bacteriological analysis
    - 1. Comparison of methods
    - 2. Types of reporting
  - D. Units of measure
  - E. Chains of custody and reporting
- V. Regulations and Administrative Duties
  - A. The Safe Drinking Water Act and other statutes
  - B. Drinking water regulations and facility compliance
  - C. Recordkeeping
  - D. Use of American Waterworks Assn and National Sanitation Foundation standards

### **Assignment:**

- 1. Reading assignments averaging 20 pages per week.
- 2. Weekly problem solving homework assignments related to surface and groundwater supplies and treatment.
- 3. Quizzes: one quiz each class session, except first and last.
- 4. Final exam.
- 5. Field trip to treatment plant.

### **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.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

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

Homework problems

Problem solving  
15 - 25%

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

None

Skill Demonstrations  
0 - 0%

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

Multiple choice, True/false, Completion, Short answer.

Exams  
65 - 75%

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

Class participation.

Other Category  
5 - 10%

### **Representative Textbooks and Materials:**

Kerri, Ken. Water Treatment Plant Operation, Volume II--5th Edition.  
California State University, Sacramento: 2006.  
Instructor prepared materials.