

WTR 110 Course Outline as of Fall 2023

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	6	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:
In this course, students will learn the knowledge and skills required to safely operate public drinking water treatment facilities and help in the preparation for the State of California Water Treatment Operator exam(s). Field trip required.

Prerequisites/Corequisites:
Course Completion or Current Enrollment in WWTR 112

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: In this course, students will learn the knowledge and skills required to safely operate public drinking water treatment facilities and help in the preparation for the State of California Water Treatment Operator exam(s). Field trip required. (Grade Only)
Prerequisites/Corequisites: Course Completion or Current Enrollment in WWTR 112
Recommended:
Limits on Enrollment:

Transfer Credit:

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

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	Area	Effective:	Inactive:
CSU GE:	Transfer Area	Effective:	Inactive:
IGETC:	Transfer Area	Effective:	Inactive:
CSU Transfer:		Effective:	Inactive:
UC Transfer:		Effective:	Inactive:

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. Perform the skills necessary to independently operate and maintain a water treatment facility at the Certification Grade T1 level and, with minor supervision, at the Certification Grade T2 level.
2. Identify elements of, and ensure treatment facility compliance with, water quality regulatory requirements.

Objectives:

At the conclusion of this course, the student should 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 and types of common contaminants
4. Units of measure
5. Introduction to physical and chemical treatment technologies

B. Sources

1. Surface water and reservoir
2. The Surface Water Treatment Rule
3. Streams and rivers
4. Reservoirs
5. Watersheds and watershed 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, and filtration
 - b. Direct filtration
2. Slow sand and diatomaceous earth filtration
3. Membrane processes: microfiltration and ultrafiltration
4. Flow calculations: filtration rate, backwash rate, and 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
 - 2. Lockout/tagout procedures
 - 3. Safety Data Sheets (SDS) regulations
 - 4. Safety programs in the workplace
 - 5. 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 and 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 Association and National Sanitation Foundation standards

Assignment:

- 1. Reading assignments averaging 20 pages per week
- 2. Problem solving homework assignments (10-15)
- 3. Quizzes (9-15)
- 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 assignments

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.

Quizzes and final exam

Exams
65 - 75%

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

Class participation, including field trip

Other Category
0 - 10%

Representative Textbooks and Materials:

Water Treatment Operators Training Handbook. 3rd ed. Pizzi, Nicholas and Lauer, William. American Water Works Association. 2013 (classic)

Water Treatment Plant Operation Vol. 1. 7th ed. Kerri, Kenneth. University Enterprises, Inc. 2017 (classic)

Instructor prepared materials.