

# WATR 157: WATER TREATMENT II

## Citrus College Course Outline of Record

| Heading                 | Value                         |
|-------------------------|-------------------------------|
| Effective Term:         | Fall 2023                     |
| Credits:                | 3                             |
| Total Contact Hours:    | 54                            |
| Lecture Hours :         | 54                            |
| Lab Hours:              | 0                             |
| Hours Arranged:         | 0                             |
| Outside of Class Hours: | 108                           |
| Strongly Recommended:   | WATR 156.                     |
| Transferable to CSU:    | No                            |
| Transferable to UC:     | No                            |
| Grading Method:         | Standard Letter, Pass/No Pass |

## Catalog Course Description

This is a course covering water resources, water quality, unit operations of advanced water treatment systems, public health, water chemistry and microbiology, and fluoridation. This course prepares students for the T3, T4, and T5 Water Treatment Operator's Certificate given by the California State Water Resources Control Board (Ca SWRCB). This course may also be used to apply to take all levels of the Water Distribution Operator's Certificate examinations given by the Ca SWRCB. 54 lecture hours.

## Course Objectives

- articulate the history of water supply development and water treatment
- Determine solutions for advanced water treatment
- Solve water treatment mathematical calculations, including water quality analysis.
- Evaluate water supply sources and the variability of their quality
- Analyze water disinfection concepts and chemical treatments
- Compare and contrast federal and state domestic water quality regulations.
- Assess water source relationships and opportunities currently in the water industry.
- explain water inventory and the variability of its quality
- describe Public Health aspects of public water supplies
- assess water and wastewater relationships and water reclamation opportunities
- Understand and explain Public Laws 92-500, 93-523, Titles 17 and 22 of the California Code of Regulations (Safe Drinking Water Act)
- solve advanced water treatment mathematical calculation problems of water treatment unit operations; water quality analysis, water microbiology, bacteria, viruses, algae, and protozoans
- explain unit operations of water disinfection concepts; and chemical treatment, softening, reverse osmosis, ion exchange and electrodialysis
- Describe the process of public water fluoridation.

- Explain corrosion, chemistry, causes, prevention, treatment, odors, chemical/microbiological factors, and treatment as they apply to the water supply industry.

## Major Course Content

1. Review of Arithmetic
  - a. Problem solving
2. State Regulations
3. Contents of Domestic Water and Their Relations to Water Quality
  - a. Chemical and physical parameters
    - i. total dissolved solids
    - ii. hardness
    - iii. nitrates
    - iv. iron
  - b. Microbiological constituents
    - i. bacterial
    - ii. viruses
    - iii. algae
4. Determination of Water Quality – Testing Methods
  - a. Introduction to laboratory techniques
  - b. Evaluation of analytical data
  - c. Field trips to water laboratories
5. Water Supply Disinfection
  - a. Water supply chemistry
6. Water Softening
  - a. Lime-soda ash processes
  - b. Ion exchange softening
7. Discussion of Consumer Problems Related to Water Quality
  - a. Education of the public
8. Fluoridation
9. Demineralization
  - a. Distillation
  - b. Deionization
  - c. Reverse osmosis

## Suggested Reading Other Than Required Textbook

California Regulations Related to Drinking Water [http://www.waterboards.ca.gov/drinking\\_water/certlic/drinkingwater/documents/lawbook/dwregulations-2015-07-16.pdf](http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/dwregulations-2015-07-16.pdf)

## Examples of Required Writing Assignments

Students respond to weekly writing prompts such as: While operating a conventional surface water treatment plant during a large rainfall event you notice that your influent turbidity has drastically changed. The influent turbidity has jumped from 1 ntu to 30 ntu's, the water temperature has jumped 5 degrees and your filters are becoming unstable. What effects will this have on the process? What actions would you take? What regulations would you need to be aware of?

## Examples of Outside Assignments

Interview a water treatment supervisor and write a summary report.

## **Instruction Type(s)**

Lecture, Online Education Lecture