

Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by:	Melita Caldwell-Betties	Date:	10/08/2020
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Department	Subject	Course Number	Title
Water Technology	Water Technology WATR	505	Water Treatment Plant Operations III, IV & V (formerly WATR-105)

Units/Hours

Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
Each laboratory unit requires 3 hours per week of class time.
Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units

3.00

Total Units

3.00

Lecture Contact Hours

48.00 - 54.00

Total Contact Hours

48.00 - 54.00

Lecture Homework Hours

96.00 - 108.00

Stand Alone:

Program Applicable

AA/AS Degree General Ed Breadth Area(s):

-none-

General Education Justification:

Maximum Enrollment:

40

Maximum Enrollment Justification:

Justification:

Grading Method:

Letter Grade or P/NP

TOP code:

0958.00*

Can be Taken

1

time(s) for credit (max 4)

- ☐
- Visual or Performing Arts course that is required to meet major requirements for UC/CSU
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- ☐
- Intercollegiate athletics course
-
- ☐
- Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(75 words or less in gray box below).

The course covers sources of water, the water treatment process, water treatment plant operations, safety, water quality regulations and waterworks math. This course is designed for individuals seeking employment or already employed in the water industry. It covers the Water Treatment Plant Operator’s job-related knowledge identified by the State Water Resources Control Board examination developers as essential for minimally competent Water Treatment Plant Operator III, IV or V (T-3, T-4, or T-5).

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(25 words or less in gray box below).

This course covers advanced water treatment plant operations and procedures. Meets the requirements for the California Water Treatment Plant Operator T-3, T-4, & T-5 certification.

Need for the course:

This course compliments other courses in the Water Technology Program. It enhances student understanding of the technical aspects of water treatment in preparation of state certification testing. This course is an elective in the Water degree/certificate as well as the Environmental Studies: Water and Soil Technologies/Environmental Engineering Emphasis degree.

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details.
(For further clarification, contact the Prerequisite Subcommittee)

- WATR 503 with a Grade of C or better.

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.

-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.

- WATR 790

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)
Upon the completion of the course the student will be able to do the following:

- Improve the understanding of advanced waterworks terminology and administration.
- Distinguish various sources of water in California.

- 3. Differentiate the various sources of water available to water treatment plants and their uses.
- 4. Differentiate processes of water treatment operations and maintenance applications.
- 5. Compare and contrast the procedures and components used in water treatment operations.
- 6. Evaluate various methods of disinfection as it relates to specific cases.
- 7. Analyze and explain advanced water testing procedures.
- 8. Assess and compare regulations relating to water quality.
- 9. Analyze the hazards and safety procedures related to water treatment.
- 10. Solve advanced waterworks mathematic calculations.

Course Content:

(please number the outline of main topics and subtopics)

Lecture Only

- 1. Iron and manganese control
 - 1. Measurement
 - 2. Remedial action
 - 3. Operation of removal plan
 - 4. Maintenance of a chemical feeder
 - 5. Troubleshooting
- 2. Fluoridation
 - 1. Importance
 - 2. Programs
 - 3. Compounds used
 - 4. Systems
 - 5. Chemical feeder operations
 - 6. Safety procedures and maintenance
- 3. Water softening
 - 1. Lime soda ash softening
 - 2. Ion exchange softening
 - 3. Safety
 - 4. Sludge disposal
 - 5. Record-keeping
- 4. Trihalomethanes
 - 1. Compliance problems
 - 2. Control strategies
 - 3. Treatment process research
 - 4. Regulatory updates
- 5. Demineralization
 - 1. Sources of mineralized water
 - 2. Demineralizing process
 - 3. Reverse osmosis
 - 4. Electrodialysis
 - 5. Safety precautions
- 6. Maintenance applications
 - 1. General treatment plant maintenance
 - 2. Electrical equipment
 - 3. Mechanical equipment
 - 4. Pump maintenance
 - 5. Pump operations
 - 6. Internal combustion engines
 - 7. Chemical storage and feeders
 - 8. Tanks and reservoirs
 - 9. Building maintenance
- 7. Instrumentation

- 1. Importance of measurement and control systems
- 2. Safety hazards
- 3. Types of sensor/transmitters
- 4. Categories
- 5. Operations and preventative maintenance
- 8. Lab safety procedures
- 9. Process control calculations
- 10. Administration
 - 1. Functions of a manager
 - 2. Staffing
 - 3. Employment policies and procedures
 - 4. Communication
 - 5. Public relations
 - 6. Financial management
 - 7. Operations and maintenance
 - 8. SCADA systems
 - 9. Emergency response
 - 10. Safety programs
 - 11. Record-keeping

Methods of Instruction:

Methods of instruction may include, but are not limited to the following:

- **Method:** Lecture presentation and discussion
Integration: Presentation and discussion with supporting visual materials (PowerPoints, overheads, or multimedia) of the water topics will be used as an instructional tool to introduce concepts and terminology relevant to wastewater treatment principles throughout the course.
- **Method:** Group Discussion
Integration: Small group discussion allows for students to discuss in detail, review, and application of content. This allows for students to put into practice/use terminology, processes, and issues in the field of water treatment operations
- **Method:** Videos and/or slides
Integration: Videos and/or slides will be used to provide a better understanding of water processes. Videos will include operation and maintenance activities as well as safe methods and techniques used in water supply, delivery, and treatment operations
- **Method:** Homework
Integration: Various writing assignments will be given to summarize major concepts discussed relevant to water treatment plant operations.
- **Method:** Activity
Integration: Supplemental material will include reviews of current news articles concerning water issues such as new technology, advances in chemical conditioning, water softening corrosion control, filtration, sedimentation, and fluoridation.
- **Method:** Guest Lecturers
Integration: Guest lecturers will enhance students comprehension by exposing students to people who are up to date in water technology and real world field experience.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Class Work
Integration: Students will be evaluated on a variety of written assignments demonstrating an understanding of and ability to analyze and define water treatment terminology, concepts, and a variety of process control variables for certain treatment processes. The final written work product will be graded for accuracy,

completeness, demonstrated mastery of the subject matter.

- **Method:** Midterm and Final Examination

Integration: Periodic testing at the midpoint and final week of the semester will be utilized to determine content understanding of terminology, knowledge of subject matter, and the ability to evaluate water treatment operations. The final written work product will be graded for accuracy, completeness, demonstrated mastery of the subject matter.

- **Method:** Homework

Integration: Written out of the classroom assignments will be utilized to determine understanding of content, terminology and knowledge as well as demonstrate proficiency in the subject matter. The final written work product will be graded for accuracy, completeness, demonstrated mastery of the subject matter.

- **Method:** Quizzes

Integration: Periodic short objective tests of course-related concepts will be assigned such as how water treatment systems operate; safety; and, identifying process control variables for treatment processes such as water softening corrosion control, filtration, and disinfection processes. The final product will be graded on accuracy, completeness, and demonstrated proficiency in the subject matter.

- **Method:** Special Projects and Case Studies

Integration: Students will conduct research related to concepts and skills developed throughout the course. Students will compare and contrast a variety of water treatment processes as well as operational costs. The final written work product will be graded for completeness and demonstrated mastery of the subject matter.

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

1. Review the series of process-related math problems on the water filtration process. Given the dimensions of a gravity filter-20 feet in length by 15 feet receiving an influent flow rate of 300 gallons per minute; calculate the filtration rate in gallons per minute per square foot.

2. Read the topic of "Triaholomethane Formation" and the negative impacts on the disinfection process. Write a short one paragraph on the assigned reading.

3. When starting a chlorine gas chlorinator, list the safety procedures an operator should employ to check the system for leaks?

Textbooks:

- California State University, Office of Water Programs (2015). *Water Treatment Plant Operation, Volume II, 6th edition* (4th or current/e). California State University. ISBN: 978-1-59371-038-5

● Misstear. B., Banks, D. (2017). *Water Wells and Boreholes, 2nd Edition* Wiley-Blackwell. ISBN: 978-1-118-95170-5

● Pizzi, Nicholas G.; Lauer, William C. (2013). *Water Treatment Operator Training Handbook. 3rd ed.* American Water Works Association. ISBN: 978-158321-861-7

● Shammass, Nazih K., Wang, Lawrence K (2015). *Water Engineering: Hydraulics, Distribution and Treatment.* Wiley, John & Son Inc.. ISBN: 978-0-470-39098-6.

Other Resources:

Minimum Qualification

- Environmental Technologies

