Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by: Melita Caldwell-Betties **Date:** 10/08/2020

Department	Subject	Course Number	Title
Non-Credit Water Technology	Non-Credit Water Technology NC/WATR	915	Test Preparation for Water Treatment Operations III, IV, & V

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.

Total Units

Total Contact Hours

8.00 - 16.00

Stand Alone:

Stand Alone

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

-none-

General Education Justification:

Maximum Enrollment: 40

Maximum Enrollment Justification: Justification:

Grading Method: NC-P/SP/NP

TOP code: 0958.00*

Can be Taken 99 **time(s) for credit** (max 4)

- Visual or Performing Arts course that is required to meet major requirements for UC/CSU
- 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).

This refresher course covers the expected Range of Knowledge (ROK) required to obtain the California State Water Resources Control Board (SWRCB) Water Treatment Operator License at the T3, T4, and T5 level which serves as the foundation of the (SWRCB) Exam.

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 the exam preparation knowledge to obtain the industry certification as a Water Treatment Operator at the level T3, T4, and T5 level.

Need for the course:

There is an increasing demand for advanced refresher course offerings in Water Technology (WST). This course is designed to prepare students for journeyman level certification examinations as Water Treatment Operators at the level T3, T4, and T5 level. This noncredit exam preparation course also will allow students to participate in job-specific technical training.

Prerequisite(s):

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

-none-

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 503
- WATR 505
- NC/WATR 913

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:

1. Examine the specific requirements for passing the State Water Resources Control Board (SWRCB) Water Treatment Three (T3), Treatment Four (T4), or Treatment Five (T5) Exam and attain certification.
2. Categorize the knowledge, skills, and abilities (KSAâ€™s) related to the duties of a journey-man level water treatment plant operator, which serves as the foundation of the (SWRCB) Exam.
3. Describe the examination format and scoring rubric of the state certification examination.
4. Review practice test questions including actual questions designed to measure the industry competencies required for certification.

5. Dissect multiple-choice questions of the type that appear on the state certification exam.
6. Infer advance waterworks math processes to word problems typically encountered on the SWRCB Water Treatment examinations utilizing the appropriate mathematical formulas to calculate design and operational values.
7. Integrate valuable test preparation strategies such as note-taking, time management, reading for comprehension, and identification of math concepts essential to passing the state examination.
8. Explain at a level understandable by a non-technical person how to utilize evidence-based process control interventions discussed in the course to relevant real-life situations.

Course Content:

(please number the outline of main topics and subtopics)

1. Disinfection
    1. Chlorine
    2. Ultraviolet radiation method
    3. Ozone
    4. Oxygen
    5. Chlorine dioxide
    6. Potassium permanganate
    7. Chloramination
2. Laboratory procedures
    1. Sample collection and preservation techniques
    2. Lab safety, identification of chemicals, preservation techniques
    3. Coliform bacteria
        1. Multiple Tube Fermentation method or Most Probable Number (MPN) procedure
            1. The presumptive test
            2. The confirmed test
            3. The completed test
        2. Membrane Filter (MF) method
            1. Presence-Absence (P-A) method
            2. Collilert method
            3. Colisure method
3. Scaling and corrosion
    1. Basic causes and control
    2. Practical corrosion control
    3. Scaling and corrosive properties of water
4. Langelier Saturation Index
5. Marble test
6. Fluoridation methods and control
    1. Physiological effects of fluorides
    2. Sources of fluorides in water
    3. Fluoride compounds
    4. Fluoride feeding equipment
    5. Control methods
    6. Safety
7. Iron and manganese control
    1. Sources of iron and manganese
    2. Color occurrence of red water, taste and odor
    3. Permissible levels
    4. Oxidation and precipitation
        1. Aeration, ozonation
        2. Addition of chlorine, potassium permanganate, chlorine dioxide
    5. Manganese greensand filter
    6. Membrane filtration
    7. Sequestration

8. Lime softening
9. Ion exchange
10. Aeration
    1. Removal of carbon dioxide, methane, hydrogen sulfide, radon, iron and manganese, taste and odor, volatile organic compounds (VOCs)
    2. Types of aerators
11. Membrane process
    1. Electric driven processes
    2. Pressure driven processes
    3. Micro-filtration
    4. Ultra-filtration
    5. Nano-filtration
12. Reverse osmosis and desalination
    1. Optimization of system pressure
    2. Pre-treatment of feed water
    3. Energy use
    4. Wastewater discharge and treatment
    5. Extending life of memrane elements
13. State and federal regulations
14. Current issues:
    1. Perchlorates
    2. Groundwater over-draft and recharge programs
    3. Drought, conservation and recycling
    4. Pharmaceuticals in source water
15. Emergency planning
    1. Vulnerability assessment
    2. Mandatory OSHA and EPA emergency response plans
16. Health and safety programs
    1. Key elements of an effective health and safety program
    2. Successful implementation

Methods of Instruction:

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

- **Method:** Activity
  Integration: Students will be assigned word problems with increasing levels of difficulty and will utilize algebraic reasoning to demonstrate proficiency in advance waterworks mathematics.
- **Method:** Lecture
  Integration: Lecture presentation and discussion with supporting visual materials (overhead slides or multimedia), introducing concepts and terminology relevant to advance water treatment processes and water treatment design parameters.
- **Method:** Discussion
  Integration: Students may participate in individual and/or group activities designed to enhance concept formation or application of information pertinent to water treatment operations, health, safety, and the environment.
- **Method:** Readings
  Integration: Students will synthesize advance water treatment principles from various types of authentic materials, such as textbooks, journals, and manuals identified by the industry as best practice.
- **Method:** Audio-Visual
  Integration: The instructor will utilize videos that illustrate various aspects of water treatment. Videos will cover leak detection, overflows, disruptive events, and public health notifications.

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 Participation
  Integration: Class participation with be accomplished through small group activities and discussion of concepts or treatment strategies. These activities may be rewarded with points for participation, but not necessarily graded with variable points. Students will be assessed on comprehension and knowledge of water treatment terminology, operations, schematics, process control, and safety procedures. The final work product will be graded for accuracy, completeness, and demonstrated mastery of the subject matter.
- **Method:** Class Work
  Integration: Student's practice worksheets will be assessed on the understanding of applied math concepts to calculate treatment plant design and operational values. The final written work product will be graded for accuracy, completeness, and demonstrated mastery of the subject matter.
- **Method:** Quizzes
  Integration: Periodic short objective tests of course-related concepts will be used to assess the students' comprehension and retention in water treatment systems operation and advance waterworks mathematics. The final written work product will be graded for accuracy, completeness, and demonstrated mastery of the subject matter.
- **Method:** Exams/Tests
  Integration: A combination of objective questions of important concepts will be given to assess the students' knowledge and comprehension on material covering an operator's job-related knowledge as identified by the California State Water Resources Control Board as essential for a competent water industry operator. The final written work product will be graded for accuracy, 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. In a small group setting of peer students review the handout entitled “Expected Range of Knowlege for Water Treatment Operators." Be prepared to discuss the professional responsibilities of operators for maintaining all policies and standards for health, safety, and the environment.
2. Review the assigned mathematical worksheet "Filtration Math." Perform the advanced mathematical calculations to determine the filtration loading rate, percent backwash, volume and flow.
3. In preparing for the state examination, an understanding of its structure and content is helpful. Typically, the questions are divided into two types: multiple choice and math problems. The expected ranges of knowledge under examination will cover the following subjects: operation and maintenance of water treatment systems, state regulations, administrative duties, and operator certification. Specific questions on the evaluation of water unit processes, overall plant performance, as well as, basic supervision responsibilities will also be examined. This practice test consists of a variety of sample test questions designed by the state examiners to measure the industry competencies required for certification. You will be given 3½ hours to complete the examination. Prior to the submitting the examination for scoring, you are encouraged to go back, review all questions, and make changes (if any) within the time allotted. To pass the test, you must achieve a minimum total score of 70 percent.

Textbooks:

- California State University, Office of Water Programs (2015). *Water Treatment Plant Operation, Volume II, 6th or current ed.* California State University. ISBN: 978-1-59371-068-2
- California State University . Small Water System Operation and Maintenance, Sixth Edition, ed. Office of Water Programs (2018). *Small Water System Operation and Maintenance, Sixth Edition* California State University. ISBN: 978-1-323-80066-9

Other Resources:

Minimum Qualification

- Environmental Technologies