

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
Non-Credit Water Technology	Non-Credit Water Technology NC/WATR	922	Test Preparation for Wastewater 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) Wastewater Treatment Operator License at the Grade Three, Four, and Five level.

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 in wastewater treatment operations at the Grade Three, Four, and Five 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 state certification examinations as Wastewater Treatment Operator License at the Grade Three, Four, and Five 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 520 or
- WATR 522 or
- NC/WATR 920

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) Wastewater Treatment Plant Operator Grade Three, Four, or Five exam and attain certification.
2. Categorize the knowledge, skills and abilities (KSA™s) related to the duties of a journey-man level wastewater 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 wastewater technology math processes math processes to word problems typically encountered on the SWRCB Wastewater Treatment examinations utilizing the appropriate mathematical formulas to calculate design and operational values.
- 7. Synthesize relevant operational data and compose answers to essay questions in a clear, concise, and orderly manner.
- 8. Integrate the proven success strategies such as time management, reading for comprehension, and note-taking required for passing the exam.
- 9. 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. Safety
 - 1. Confined Space
 - 2. Lock-out/tag-out procedure
 - 3. Chemical and biological hazards
 - 4. Hydrogen sulfide and oxygen deficiency
 - 5. Safety Data Sheet (SDS)
 - 6. Employee Right-to-Know (RTK) Laws
- 2. Relationship between wastewater treatment and public health
 - 1. Reasons for treating wastewater
 - 2. Sources
 - 3. Familiarity with effluent disposal regulations
 - 4. National Pollutant Discharge Elimination System (NPDES)
 - 5. Federal Clean Water Act
 - 6. California Code of Regulations (CCR)
 - 7. Title 22
- 3. Operation and maintenance procedures for wastewater treatment
 - 1. Compatible and non-compatible wastes
 - 2. Inflow and infiltration (I/I)
- 4. Preliminary treatment
 - 1. Odor control-wet scrubbers and chemical treatment
 - 2. Pre-aeration
 - 3. Flow equalization
- 5. Secondary treatment-biological processes
 - 1. Trickling filters
 - 2. Activated sludge systems
 - 3. Plant start-up
 - 4. Microbiology
 - 5. Process modifications
 - 6. Operational control options
- 6. Biological nutrient removal
 - 1. Nitrogen
 - 2. Phosphorous
- 7. Effluent Disinfection
 - 1. MPN reduction
 - 2. Chlorination/dechlorination
 - 3. Chloramination
 - 4. Breakpoint chlorination
 - 5. Ozonation
 - 6. Ultra-violet (UV)
- 8. Tertiary treatment processes
- 9. Chemical-physical processes

- 10. Filtration
- 11. Solids handling and disposal
 - 1. Thickening
 - 1. Gravity thickener
 - 2. Dissolved air floatation (DAF)
 - 3. Gravity belt thickener
 - 2. Stabilization
 - 1. Anaerobic digestion
 - 2. Process start-up/shut-down
 - 3. Classifications
 - 4. Operational controls
 - 3. Aerobic digestion
 - 1. Solids loading
 - 2. Oxygen uptake rate
 - 4. Sludge Dewatering
 - 1. Belt presses
 - 2. Centrifuge
 - 3. Drying beds
 - 5. Sludge disposal
- 12. Evaluation of wastewater unit processes
 - 1. Troubleshooting
 - 2. Process control and monitoring
 - 3. Laboratory testing
 - 4. Sampling, preservation and holding times
 - 5. Chain of custody
 - 6. Dissolved oxygen
 - 7. Settleability
 - 8. Coliform Solids-total,suspended, and dissolved
- 13. Solve wastewater related math problems
 - 1. Hydraulic and organic loading rate
 - 2. Activated sludge (MCRT and F:M Ratio)
 - 3. Wasting rate
 - 4. Chemical dosage
 - 5. Sludge production and thickening
 - 6. Sludge digestion
 - 7. Sludge dewatering
 - 8. TBOD calculations
 - 9. CBOD calculations
 - 10. NBOD calculations
 - 11. Pumping rate
 - 1. Horsepower
 - 2. Efficiency
 - 3. Energy
- 14. Administration
 - 1. Communication
 - 2. Public service
 - 3. Interpersonal relations

Methods of Instruction:

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

- **Method:** Activity
- **Integration:** Activities such as word problems will be assigned with increasing levels of difficulty and will utilize algebraic reasoning to demonstrate proficiency in advance wastewater technology mathematics.

- **Method:** Lecture
Integration: Lecture, presentation, and discussion with supporting visual materials (overhead slides or multimedia), introducing concepts and terminology relevant to advance wastewater treatment processes and operational 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 wastewater treatment operations, health, safety, and the environment.
- **Method:** Readings
Integration: Students will synthesize advance wastewater treatment principles from various types of authentic materials, such as textbooks, journals, and manuals identified by the industry as best practice.
- **Method:** Film/video Viewing and Discussion
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 will consist of 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 wastewater treatment terminology, operations, schematics, process control, and safety procedures. The final work product will be graded for accuracy, completeness, demonstrated mastery of the subject matter.
- **Method:** Class Work
Integration: 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, 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 wastewater treatment systems operation and advance wastewater technology mathematics. The final written work product will be graded for accuracy, completeness, 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 wastewater industry operator. The final written work product will be graded for accuracy, completeness, 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 "Compatabile and Non-compatible Wastes." Be prepared to define compatabile and non-compatible wastes and explain the importance of an operator being familiar with waste contributors of a wastewater collection system.
2. Review the assigned mathematical worksheet entitled "Horsepower Calculations." A pump is discharging 1100 gallons per minute (gpm) against a head of 65 feet. The wire-to water efficiency is 70 percent. If the cost of power is \$0.025/kW-hr., what is the cost of the power consumed during a week in which the pump runs 80 hours? Perform the advanced mathematical calculations to determine the power consumption used pump water at a given flow rate.

3. In preparing for the state examination, an understanding of its structure and content is helpful. Typically, the questions are divided into four types: true-false, multiple choice, essay, and math problems. The expected ranges of knowledge under examination will cover the following subjects: operation and maintenance of wastewater treatment systems, state regulations, administrative duties, and operator certification. Specific questions on the evaluation of wastewater 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 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 and a score of at least 50 percent on the math questions.

Textbooks:

- California State University, Office of Water Programs (2017). *Operation of Wastewater Treatment Plants, Volume II, 7th edition* California State University. ISBN: 978-1-59371-038-5
- Spellman, Frank R. (2013). *Handbook of Water and Wastewater Treatment Plant Operations, Third Edition* CRC Press. ISBN: 978-1-46655-337-8
- California State University, Office of Water Programs (2006). *Advanced Waste Treatment, 5th edition* California State University. ISBN: 978-1-59371-035-4

Other Resources:

Minimum Qualification

- Environmental Technologies