

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	920	Test Preparation for Wastewater Treatment Operations I & II

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:

Course requires significant response to written materials - check all that apply:

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 One and Grade Two 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 Wastewater Treatment Plant Operator at the Grade One and Two level.

Need for the course:

There is an increasing demand for refresher course offerings in Water Technology (WST). This course is designed to prepare students for entry-level state certification examinations as a Wastewater Treatment Plant Operator at the Grade One and Two level. This noncredit exam preparation course will also 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

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:

- Examine the specific requirements for passing the State Water Resources Control Board (SWRCB) Wastewater Treatment One or Two Exam and attain certification.
- Categorize the knowledge, skills and abilities (KSAs™s) related to the duties of an entry-level wastewater treatment plant operator, which serves as the foundation of the (SWRCB) Exam.
- Describe the examination format and scoring rubric of the state certification examination.
- 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 wastewater technology 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. 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 apply process and operational concepts 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. Employee right-to-know laws
- 2. Wastewater treatment system operator
 - 1. SWRCB requirements for certification
 - 2. Application deadlines, training and education required for certification
 - 3. Relationship between wastewater treatment and human health
- 3. Reasons for treating wastewater
 - 1. Definition of pollution
 - 2. National Pollutant Discharge Elimination System (NPDES)
- 4. Sources
 - 1. Characteristics
 - 2. Estimate quantities
 - 3. Wastewater collection systems and computation of flow in collection system
 - 4. Flow diagrams of typical treatment processes
- 5. Preliminary treatment
 - 1. Grit removal (aerated and non-aerated)
 - 2. Screening and comminution)
- 6. Primary treatment-sedimentation and floatation theory
 - 1. Removal efficiency
 - 2. Hydraulic loading
 - 3. Surface overflow rates
 - 4. Weir overflow rates
 - 5. Tank design configuration: rectangular vs. circular
 - 6. Removal of sludge and floatables
- 7. Secondary treatment processes
 - 1. Stabilization ponds
 - 2. Theory of operation
 - 1. Aerobic ponds
 - 2. Anaerobic ponds
 - 3. Facultative ponds
 - 3. Hydraulic and organic loadings
 - 4. Efficiencies
- 8. Trickling filters
 - 1. Theory of operation
 - 2. Roughing filter
 - 3. Low, high, and standard rate filter
 - 4. Recirculation
 - 5. Hydraulic and organic loadings
 - 6. Treatment efficiencies
- 9. Activated sludge

- 1. Theory of operation
 - 2. Conventional activated sludge
 - 3. Applicability to various types of waste
- 10. Disinfection Processes
 - 1. Chlorination
 - 2. Theory of disinfection
 - 3. Effluent disinfection
 - 4. Dechlorination
- 11. Introduction to tertiary treatment processes
- 12. Introduction to solids handling and disposal
- 13. Introduction to sampling and simple analysis of wastewater constituents
 - 1. pH
 - 2. Biochemical Oxygen Demand (BOD)
 - 3. Chlorine residual
 - 4. Dissolved oxygen
 - 5. Coliform bacteria
- 14. Solve wastewater related math problems
 - 1. Volume and surface areas
 - 2. Flow and velocity
 - 3. Pumping rates
 - 4. Solids concentration
 - 5. Removal efficiency (percent removal)
 - 6. Detention time
 - 7. Hydraulic (surface or overflow) loading rates
 - 8. Organic loading rates
 - 9. Recirculation ratios
 - 10. Chlorine residual, demand, feed, and dosages

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 wastewater technology math.
- **Method:** Lecture
Integration: Lecture presentation and discussion with supporting visual materials (overhead slides or multimedia), introducing concepts and terminology relevant to wastewater treatment principles throughout the course (e.g.: sources of raw water supplies and related water quality issues, types of disinfection and their appropriate applications, system operation, regulatory impacts, and safety issues in the water treatment industry).
- **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, and maintenance.
- **Method:** Readings
Integration: Students will synthesize 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 preliminary treatment, primary sedimentation, sedimentation, advanced treatment, disinfection, and solids handling.

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: Class work will consists of practice worksheets examining applied math concepts covered, such as, preliminary treatment, sedimentation, secondary treatment, disinfection, advance treatment, and solids handling. 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 water treatment systems operation and wastewater technology math. 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 minimally competent water industry operators Topic areas to be examined included such as wastewater technology math, water sources, operational processes, water quality, and residual solids management. 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 "Why Treat Wastes?" Become familiar with water quality degradation issues from human activities. Be prepared to discuss in class point and non-point pollution sources and the objectives of wastewater treatment.
2. Review the assigned mathematical worksheet "Activated Sludge Calculations." Perform the basic mathematical calculations to determine the pounds of solids under aeration, the Mean Cell Residence Time (MCRT), and Food to Microorganism Ratio (F:M).
3. In preparing for the state examination, an understanding of its structure and content is helpful. Typically, the questions are divided into three types: true-false, multiple choice, and math problems. The expected ranges of knowledge under examination will cover the following subjects: raw water sources, wastewater treatment processes, and laboratory procedures. Specific questions on the operation and maintenance of wastewater treatment systems, state regulations, administrative duties, and operator certification 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 2½ 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 and a score of at least 50 percent on the math questions.

Textbooks:

- California State University, Office of Water Programs (2019). *Operation of Wastewater Treatment Facilities, Volume I, 8th ed.* California State University. ISBN: 978-0-13-587898-9
- Spellman, Frank R. (2013). *Handbook of Water and Wastewater Treatment Plant Operations* CRC Press. ISBN: 978-1466553378

Other Resources:

Minimum Qualification

- Environmental Technologies