

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	520	Wastewater Treatment Plant Operations I & II (formerly WATR-120)

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

Lecture Contact Hours

48.00 - 54.00

Lecture Homework Hours

96.00 - 108.00

Total Units

3.00

Total Contact Hours

48.00 - 54.00

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
-
- ☐
- 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 course is an introduction to wastewater treatment. Students will explore the scope, limits, and methods of wastewater treatment processes through readings, discussions, analysis, and laboratory study. This course is designed for individuals seeking employment or already employed in the wastewater field. It covers the wastewater operator's job-related knowledge identified by the CSWRB examination developers as essential for a minimally competent Grade I or Grade II Wastewater Treatment Plant Operator.

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 explores the wastewater treatment processes through readings, discussions, analysis, and laboratory study. Prepares student for the CSWRB Wastewater Treatment Plant Operator examinations.

Need for the course:

Although water pollution problems are almost as old as civilized man, water pollution abatement still remains a fairly new science. The wastewater treatment field, like so many others, is changing rapidly. 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)

-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 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:

- Analyze, synthesize, and evaluate wastewater treatment processes and operations in an increasingly complex manner.
- Assess and demonstrate competent and efficient plant operations through real-life examples by making sound decisions;

- treatment processes, safety, parameters, hydraulics, health and environmental issues.
3. Evaluate wastewater processes as well as the fundamental concepts of wastewater theory.
 4. Differentiate analytical skills as a decision-making tool in the evaluation of process and overall plant performance in wastewater treatment plant operations.
 5. Analyze and interpret performance calculations for wastewater processes and apply these techniques to real-life situations.
 6. Compare and contrast the appropriate process control measures in making sound operational decision.
 7. Compare, contrast, and apply control techniques to specific and practical wastewater situations.
 8. Evaluate timely topics related to the pollution control industry.
 9. Examine wastewater theory in practice through the case studies and analysis of current articles in the media.
 10. Demonstrate effective oral and written communication skills and apply these tools in a regulatory context (i.e. the public health aspects of the water supply).
 11. Assess the importance and the function of wastewater treatment plant operations in the protection of public health and the environment through applied theory to practice via case studies.

Course Content:

(please number the outline of main topics and subtopics)

1. Safety procedures
 1. Confined space entry
 2. Lockout/tag-out procedure
 3. Personnel protective equipment (PPE)
 4. Head, foot, and hand protection
2. Wastewater treatment system operator
 1. Typical work and duties
 2. Job opportunities and sources to locate openings
 3. SWRCB requirement for certification, application deadlines training and education required for license
3. Relationship of sewage to public health
 1. Reasons for sewage treatment
 2. Sources
 3. Characteristics
 4. Estimate quantity
4. Individual treatment and disposal systems
 1. Imhoff tank
 2. Septic tank
 3. Leach field systems
 4. Drying beds
5. Preliminary treatment
 1. Grit removal, aerated and non-aerated quantities
 2. Screening and comminution
 3. Primary treatment
6. Sedimentation and flotation, theory
 1. Removal efficiency
 2. Hydraulic loadings
 3. Weir overflow rates
 4. Tank design
 5. Configuration: rectangular vs. circular
 6. Removal of sludge and floatables
7. Secondary Treatment
 1. Trickling Filters
 1. Theory of operation
 2. Roughing filter
 3. Low and high rate filter

- 4. Recirculation ratio
 - 5. Treatment efficiencies
- 2. Activated sludge
 - 1. Theory of operation
 - 2. Conventional activated sludge
 - 3. Applicability to various types of waste
- 3. Oxidation ponds-theory of operation
 - 1. Aerobic ponds
 - 2. Anaerobic ponds
 - 3. Facultative ponds
 - 4. Hydraulic and organic loadings
 - 5. Efficiencies
- 8. Introduction to sampling and simple analysis of wastewater constituents:
 - 1. pH
 - 2. BOD
 - 3. Chlorine residual
 - 4. Dissolved oxygen
 - 5. Coliform bacteria
- 9. Disinfection processes
 - 1. Chlorination
 - 2. Theory of disinfection
- 10. Introduction to secondary and tertiary treatment
- 11. Math calculations
 - 1. Volumes and surface areas
 - 2. Overflow rates
 - 3. Pumping rates
 - 4. Detention time
 - 5. Flow, velocity and area
 - 6. Solid concentration
 - 7. Removal efficiency (percent removal)
 - 8. Chlorine feed, demand, dosage, and residual

Methods of Instruction:

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

- **Method:** Lecture
Integration: Presentation and discussion with supporting visual materials (overheads or multimedia) of the wastewater topics will be used as an instructional tool to explain, differentiate and recognize terminology, sources of wastewater and issues, processes, certification process, and safety.
- **Method:** Audio Visual
Integration: Videos and/or slides will be used to provide a better understanding of water or wastewater processes or activities. Videos will include on site processes such as safety issues, current issues in water supply, delivery and treatment systems.
- **Method:** Small Discussion Groups
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 wastewater treatment operations.
- **Method:** Field Trips
Integration: A field trip may be conducted to tour a wastewater facility to expose students to municipal wastewater treatment operations.
- **Method:** Homework
Integration: Various writing assignments will be given to summarize major concepts discussed relevant to wastewater treatment plant operations.
- **Method:** Activity

Integration: Supplemental material will include reviews of current news articles concerning water or wastewater issues such as new technology, advances in process control, preliminary treatment, sedimentation, floatation, secondary treatment, sludge removal disinfection, certification, and safety.

- **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:** Midterm and Final Examination
Integration: Students will be evaluated on a variety of written assignments demonstrating an understanding of and ability to analyze and define wastewater treatment terminology, concepts, and a variety of process control variables for certain treatment processes. The final written product will be graded for accuracy, completeness, demonstrated mastery of 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 wastewater treatment processes as well as operational costs. The final written product will be graded for accuracy, completeness, demonstrated mastery of the subject matter.
- **Method:** Small group discussion
Integration: Small group discussion will be conducted to discuss in detail, review and application of course content. For example, students will practice use of terminology, processes, and examine environmental issues in the field of wastewater treatment operations. The final product will be graded for demonstrated mastery of the subject matter.
- **Method:** Quizzes
Integration: Periodic short objective tests of course-related concepts such as how wastewater treatment systems operate; safety; and, identifying process control variables for treatment processes such as dissolved air floatation, activated sludge, and chlorine disinfection. The final written product will be graded for accuracy, completeness, demonstrated mastery of the subject matter.
- **Method:** Class Work
Integration: Students will be evaluated on a variety of written assignments demonstrating an understanding of and ability to analyze and define wastewater treatment terminology, concepts, and a variety of process control variables for certain treatment processes. The final written product will be graded for accuracy, completeness, demonstrated mastery of the subject matter.
- **Method:** Homework
Integration: Homework assignments will be administered to assess understanding of content, terminology and knowledge. The final written product will be graded for accuracy, completeness, demonstrated mastery of the subject matter.
- **Method:** Supplementary material
Integration: Supplemental material will include reviews of current news articles concerning wastewater issues such as new technology, advances in process control, changes in certification, and safety. The final written product will be graded for 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. Read the chapter on wastewater stabilization ponds.
 1. Be prepared in class, the difference between aerobic, anaerobic, and facultative ponds.
 2. Be prepared to discuss, in class, the difference between wastewater lagoon, oxidation ponds, and polishing ponds.
2. Write a one-page report on safety hazards commonly found at a typical wastewater treatment plant.

- ### Textbooks:

- ## Other Resources:

- Environmental Technologies