Course Outline

**COURSE:** WTRM 207  \hspace{1cm} **DIVISION:** 50  \hspace{1cm} **ALSO LISTED AS:** WTRM 107

**TERM EFFECTIVE:** Spring 2019  \hspace{1cm} **CURRICULUM APPROVAL DATE:** 10/09/2018

**SHORT TITLE:** BEG WASTEWATER TRT OPS

**LONG TITLE:** Beginning Wastewater Treatment Operations

<table>
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<th>Units</th>
<th>Number of Weeks</th>
<th>Contact Hours/Week</th>
<th>Total Contact Hours</th>
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<td>18</td>
<td>Lecture: 3</td>
<td>Lecture: 54</td>
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<td>Lab: 0</td>
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**COURSE DESCRIPTION:**

This course covers an introduction to the operations and maintenance of a wastewater treatment facility. Topics include industry careers, certifications, advanced wastewater treatment methods, valves and equipment, as well as industry standard math formulas and conversion factors. This course is designed to prepare the student to take the State of California Operator in Training (OIT) and Wastewater Treatment Operator exams (WW1, WW2). This course was previously listed as WTRM 107. **ADVISORY:** Eligible for Math 430 or equivalent Arithmetic proficiency.

**PREREQUISITES:**

**COREQUISITES:**

**CREDIT STATUS:** D - Credit - Degree Applicable

**GRADING MODES**

- L - Standard Letter Grade

**REPEATABILITY:** N - Course may not be repeated

**SCHEDULE TYPES:**

- 02 - Lecture and/or discussion
- 05 - Hybrid
- 72 - Dist. Ed Internet Delayed
STUDENT LEARNING OUTCOMES:
1. Describe the various methods, regulations, and procedures related to wastewater treatment standards.
   Measure of assessment: Exams, Homework
   Year assessed, or planned year of assessment: 2018
   Semester: Spring

2. Demonstrate the ability to meet the written test standards for the OIT, WW1 and WW2 State of California wastewater treatment operator exams.
   Measure of assessment: Quizzes, Exams, Worksheets
   Year assessed, or planned year of assessment: 2018

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS
Curriculum Approval Date: 10/09/2018

2 Hours
Student Performance Objectives: Discuss networking potential. Define industry standard acronyms. Recognize professional organizations and the certifications offered. Outline state organizations and the certifications offered. Identify career opportunities locally, statewide, and nationally. Explain industry standard basic math formulas and conversions. Describe how to engage in industry networking. Describe the application of basic math in wastewater treatment.

6 Hours
Student Performance Objectives: Define and discuss pretreatment, primary treatment, secondary treatment, and tertiary treatment stages. Explain the different types and characteristics of wastewater. Describe types of collection systems and manhole placement requirements. Calculate areas and volumes. Convert cubic feet to gallons to pounds. Calculate linear feet measurements, perimeters, and circumference. Explain the pounds formula. Calculate velocity. Explain the basics of wastewater treatment, including the characteristics of wastewater, wastewater collection systems and associated basic math.

6 Hours
Content: Preliminary Treatment. Primary Treatment. Basic Math.

6 Hours
Student Performance Objectives: Outline the key biological actions in wastewater treatment. Identify the common types of bacteria in the various biological processes. Recognize how temperature, pH, and dissolved oxygen affect biological processes. Identify the various types of ponds used. Describe parameters of pond classification. Describe operational controls of the different classification of ponds. Calculate hydraulic and organic loading to the ponds. Calculate pond evaporation rate. Convert temperature from degrees Fahrenheit to centigrade, and from degrees centigrade to Fahrenheit. Explain critical biological concepts, including those associated with pond and lagoons.

3 Hours Content: Secondary Treatment. Fixed Film Processes. Trickling Filters. Rotating Biological Contactors. Basic Math.
Student Performance Objectives: Outline the various fixed film secondary treatment processes. Describe the main parts of a trickling filter. Identify the main parts of a rotating biological contactor. Explain performance limits. Identify types of bacteria in the bio-mass. Discuss sloughing (life) cycles of the bio-mass. Calculate
hydraulic loading and organic loading for the various fixed film processes. Discuss secondary treatment, 
fixed film processes, trickling filters and rotating biological contactors.

3 Hours

Trickling Filter Solids Contact. Basic Math.

Student Performance Objectives: Identify and explain the many activated sludge processes. Discuss 
performance limits. Identify the types of bacteria in activated sludge. Explain aeration types and 
requirements. Outline return and wasting requirements. Define mass balance. Explain the principles of the 
combined trickling filter solids contact process. Calculate hydraulic loading and organic loading for the 
various activated sludge processes. Calculate sludge age, SVI, MCRT, 
pounds to return, and pounds to waste. Describe secondary treatment, suspended film processes, activated 
sludge, combined processes and trickling filter solids contact.

6 Hours


Student Performance Objectives: Identify the disinfection methods used in the wastewater industry. Identify 
the equipment used by different disinfection processes. Discuss the 3 forms of chlorine widely used (gas, 
liquid, dry). Explain the safe handling and use of chlorine and personal protection equipment required. 
Explain the purpose for chlorine contact time. Identify the various methods of sludge thickening. Describe 
the various types of sludge to be thickened. Calculate thickened sludge feed rates. Calculate pounds of 
chlorine needed based on percent strength of the chlorine used (gas, liquid, dry). Manipulate dose, demand, 
and residual formulas. Describe the processes for the disinfection of wastewater, including thickening of 
sludge solids.

6 Hours


Student Performance Objectives: Describe the various sludge digestion processes. Outline the aerobic 
sludge digestion process. Describe the anaerobic sludge digestion process. Identify the equipment used and 
operational controls of aerobic and anaerobic sludge digestion. Discuss sludge stabilization and digestion 
by-products. Discuss the main safety concerns regarding anaerobic digestion. Calculate volatile solids 
loading. Calculate percent reduction of volatile solids. Calculate pounds of methane gas produced per 
pound of volatile solids destroyed. Describe the components of sludge digestion, including aerobic digestion, 
aerobic digestion, sludge processing, bio-solids processing and bio-solids disposal.

6 Hours


Student Performance Objectives: Describe the various effluent disposal methods. Identify acceptable 
disposal methods for secondary and tertiary effluents. Describe the various types of equipment used for 
effluent discharge. Explain effluent reuse requirements. Calculate chlorine disinfection rates and 
dechlorination dosing rates. Calculate percent (%) removal/efficiency. Explain final effluent disposal, 
including secondary and tertiary effluent.

6 Hours


Student Performance Objectives: Identify and describe the various laboratory tests performed for process 
control and regulatory reporting requirements. Explain the measurement of pH and what each end of the 
scale represents. Outline how BOD, total solids, settleable solids, volatile solids, coliform concentration, 
turbidity, volatile acids/alkalinity, methane content, priority pollutants, and metals analysis are used in the 
operation of a wastewater treatment facility. Discuss the many 
safe practices involved in the successful operation of the facility. Identify maintenance needs. Explain the 
difference between preventive maintenance and predictive maintenance. Describe the importance of record 
keeping and log books.

Describe the roles of laboratory sampling and testing, as well as facility and equipment maintenance and 
safety in wastewater plant operations.

2 Hours
METHODS OF INSTRUCTION:
Lectures and Discussions, Visual Aids, Demonstrations, Facilities Tours (as available)

OUT OF CLASS ASSIGNMENTS:
Required Outside Hours: 68
Assignment Description: For each topic, students will review in class and text book examples and complete hand-out homework assignments.
Required Outside Hours: 40
Assignment Description: Study for quizzes and exams.

METHODS OF EVALUATION:
Writing assignments
Percent of total grade: 10.00 %
Percent range of total grade: 10% to 20% Written Homework, Other: In Class Worksheets
Problem-solving assignments
Percent of total grade: 40.00 %
Percent range of total grade: 40% to 60 % Homework Problems, Quizzes, Exams, Other: In Class Worksheets
Objective examinations
Percent of total grade: 40.00 %
Percent range of total grade: 40% to 60% Multiple Choice, True/False, Matching Items
Other methods of evaluation
Percent of total grade: 10.00 %

REPRESENTATIVE TEXTBOOKS:
Required Representative Textbooks
This is the most current edition and a standard textbook for the water/wastewater industry.
Reading Level of Text, Grade: 11th Verified by: Dana Young
ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
CSU GE:
IGETC:
CSU TRANSFER:
   Not Transferable
UC TRANSFER:
   Not Transferable

SUPPLEMENTAL DATA:
Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN:
CAN Sequence:
CSU Crosswalk Course Department:
CSU Crosswalk Course Number:
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: C
Maximum Hours: 3
Minimum Hours: 3
Course Control Number: CCC000588721
Sports/Physical Education Course: N
Taxonomy of Program: 095800