

Course Outline

COURSE: WTRM 207 **DIVISION:** 50 **ALSO LISTED AS:** WTRM 107

TERM EFFECTIVE: Fall 2020 **CURRICULUM APPROVAL DATE** 06/09/2020

SHORT TITLE: BEG WASTEWATER TRT OPS

LONG TITLE: Beginning Wastewater Treatment Operations

<u>Units</u>	<u>Number of Weeks</u>	<u>Type</u>	<u>Contact Hours/Week</u>	<u>Total Contact Hours</u>
3	18	Lecture:	3	54
		Lab:	0	0
		Other:	0	0
		Total:	3	54

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 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
- 71 - Dist. Ed Internet Simultaneous
- 72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Describe the various methods, regulations, and procedures related to wastewater treatment standards.
2. Demonstrate the ability to meet the written test standards for the WW1 and WW2 State of California wastewater treatment operator exams.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date 06/09/2020

4 Hours

Content: Instructor and Student Introductions and Networking. Acronyms throughout the Wastewater Treatment Industry. Career Opportunities in the Wastewater Treatment Industry. State and Voluntary Certifications and their Issuing Organizations. Overview of Wastewater Treatment. Basic Math.

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

Content: Introduction to Wastewater Treatment. Characteristics of Wastewater. Wastewater Collection Systems. Basic Math.

Student Performance Objectives: Define and discuss pre-treatment, 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.

Student Performance Objectives: Describe pre-treatment equipment and functions. Explain the different stages and the need for pre-treatment. Identify primary treatment equipment and functions. Recognize removal efficiency for primary treatment. Define basic primary treatment operation. Calculate surface loading rates. Calculate surface and weir overflow rates. Calculate detention time. Define the differences between preliminary treatment and primary treatment.

6 Hours

Content: Biological Concepts. Pond and Lagoons. Basic Math.

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 contractors.

3 Hours

Content: Secondary Treatment. Suspended Film Processes. Activated Sludge. Combined Processes. 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

Content: Disinfection of Wastewater. Thickening of Sludge Solids. Basic Math.

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

Content: Sludge Digestion. Aerobic Digestion. Anaerobic Digestion. Sludge Processing. Biosolids Processing. Biosolids Disposal. Basic Math.

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, anaerobic digestion, sludge processing, bio-solids processing and bio-solids disposal.

6 Hours

Content: Final Effluent Disposal. Secondary Effluent. Tertiary Effluent. Basic Math.

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

Content: Laboratory Test. Sampling. Maintenance. Safety. Record Keeping.

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

Final

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: 30% to 60 % Homework Problems, Quizzes, Exams, Other: In Class Worksheets

Objective examinations

Percent of total grade: 40.00 %

Percent range of total grade: 30% to 60% Multiple Choice, True/False, Matching Items

Other methods of evaluation

Percent of total grade: 10.00 %

0% - 20% Class Participation

REPRESENTATIVE TEXTBOOKS:

Kenneth D. Kerri. Operation of Wastewater Treatment Plants, Volume I or other appropriate college level text.. Sacramento, CA: CSU, Sacramento,2019.

Reading Level of Text, Grade: 12th Verified by: MS Word

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:

Minimum Hours:

Course Control Number: CCC000588721

Sports/Physical Education Course: N

Taxonomy of Program: 095800