WWTR 121 Course Outline as of Fall 2024

CATALOG INFORMATION

Dept and Nbr: WWTR 121 Title: WASTEWATER TREATMENT 2
Full Title: Wastewater Treatment 2
Last Reviewed: 9/11/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 157.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	ENVT 121

Catalog Description:
In this course, students will learn principles and techniques used in advanced/tertiary wastewater treatment including disinfection, chlorination, odor control, wastewater reclamation, advanced sludge treatment and disposal, laboratory control methods, the National Pollution Discharge Elimination System (NPDES) discharge requirements, report writing, and maintain records. The course will help students prepare for State Water Resources Control Board (SWRCB) Wastewater Operator Certification Grade 2 exam. A field trip to a wastewater facility during regular class hours is required.

Prerequisites/Corequisites:
Course Completion of WWTR 120

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: In this course, students will learn principles and techniques used in advanced/tertiary wastewater treatment including disinfection, chlorination, odor control,

wastewater reclamation, advanced sludge treatment and disposal, laboratory control methods, the National Pollution Discharge Elimination System (NPDES) discharge requirements, report writing, and maintain records. The course will help students prepare for State Water Resources Control Board (SWRCB) Wastewater Operator Certification Grade 2 exam. A field trip to a wastewater facility during regular class hours is required. (Grade or P/NP)
Prerequisites/Corequisites: Course Completion of WWTR 120
Recommended:
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Recognize and explain tertiary treatment processes commonly used to treat domestic and industrial waste, including effluent and solids disposal methods.2. Explain the laws and penalties governing wastewater treatment operations that apply to
operators and facilities.3. Prepare for the State Water Resources Control Board (SWRCB) Wastewater Operator Certification Grade 2 exam.
4. Prepare for the California Water Environment Association (CWEA) voluntary certification tests in Collection System Maintenance and Wastewater Treatment Plant Maintenance.
Objectives:
At the conclusion of this course, the student should be able to:
1. Describe the design, operation, and maintenance of treatment plants with advanced/tertiary processes.
2. Explain advanced sludge treatment and disposal practices.
3. Discuss the basics of industrial waste permitting, inspection, and violations.
4. Define and correctly use standard terminology and mathematical formulas related to advanced/tertiary wastewater treatment and industrial waste treatment.
5. Troubleshoot common wastewater treatment operational process problems and make decisions about appropriate corrective actions to take.
6. Recognize and explain chemical symbols, properties, and reactions related to advanced/tertiary wastewater treatment.
7. Recognize classes of contaminants found in wastewater processes and describe their

relationship to wastewater treatment.
8. Explain the laws governing wastewater treatment operations and the penalties that may be applied to operators and facilities.
9. Access reference sources appropriate to operational problems at Grade 2 in the wastewater treatment field.

Topics and Scope:

I. Overview of Wastewater Treatment Systems and Processes
- A. Primary treatment
- B. Secondary treatment
- C. Tertiary Treatment Processes
  1. Types and their applications
  2. Operational parameters
  3. Methods of filtration
  4. Nitrification/denitrification
  5. Nutrient removal

II. Activated Sludge
- A. Return activated sludge
- B. Waste activated sludge
- C. Industrial waste pretreatment

III. Solids Handling and Disposal
- A. Aerobic and anaerobic digestion of solids
- B. Methods of dewatering
- C. Composting
- D. Solids disposal

IV. Odor Control
- A. Need
- B. Odor generation and identification
- C. Solutions
  1. Chemical
  2. Biological
- D. Types of control systems
- E. Masking, modifications, and counteraction

V. Types of Nutrient Removal Processes
- A. Phosphorus
  1. Lime precipitation
  2. Alum flocculation
- B. Nitrogen
  1. Biological
  2. Chemical
  3. Physical

VI. Disinfection and Chlorination Methods
- A. Chemical
- B. Other methods
- C. Test procedures
- D. Safety

VII. Wastewater Reclamation
- A. Uses
- B. Operating procedures
- C. Regulations/monitoring
- D. Land treatment systems

VIII. Overview of Industrial Waste Treatment
A. Title 40 Code of Federal Regulations (CFR)
B. Sampling methods
C. Pretreatment
1. Preventing pass through
2. Disruption of treatment processes
IX. Overview of Instrumentation
A. Measurement and control systems
B. Principles of sensors and transducers
C. Categories of instrumentation
1. Panel instrumentation
2. Automatic controllers
3. Air supply systems
4. Lab instruments
5. Test and calibration equipment
D. Use of computers
1. Supervisory Control and Data Acquisition (SCADA)
2. Data collection and analysis
X. Laws and Regulations Governing Wastewater Treatment Operations
A. Porter-Cologne
B. Clean Water Act: National Pollutant Discharge Elimination System (NPDES)
C. Senate Bill (SB) 198
D. California Cooperative Research Centers (CRC)
E. Occupational Health and Safety Administration (OSHA) requirements
XI. Preparation for State Examinations and Certificatifications
A. California Title 23 requirements
B. State of California Water Resources Control Board Wastewater Operator Certification exam
C. CWEA voluntary certification test
1. Collection system maintenance
2. Wastewater treatment plant maintenance
D. Renewal requirements
E. Education and experience requirements for certification grades

Assignment:

1. Reading assignments (25-40 pages per week)
2. Weekly problem solving homework assignments
3. Project 1: Math problems relating to the operation of the model treatment plant
4. Project 2: Observation report of wastewater treatment plant tour
5. Quizzes (10-15)
6. Midterm exam
7. Final exam

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Project 2	Writing 10 - 20%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework assignments; project 1	Problem solving 10 - 25%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes; midterm exam; final exam	Exams 45 - 60%

Other: Includes any assessment tools that do not logically fit into the above categories.

Participation	Other Category 0 - 10%

Representative Textbooks and Materials:
Operation of Wastewater Treatment Plants, Volume II. 8th ed. Kerri, Kenneth. California State University of Sacramento. 2022.
Instructor prepared materials