

**WWTR 121 Course Outline as of Fall 2019****CATALOG INFORMATION**

Dept and Nbr: WWTR 121 Title: WASTEWATER TREATMENT 2

Full Title: Wastewater Treatment 2

Last Reviewed: 3/26/2018

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:**

Principles and techniques used in advanced/tertiary wastewater treatment including disinfection, chlorination, odor control, wastewater reclamation, advanced sludge treatment and disposal, laboratory control methods, and the National Pollution Discharge Elimination System (NPDES) discharge requirements, report writing and records. Preparation for State Water Resources Control Board (SWRCB) Wastewater Operator Certification Grade 2 exam.

**Prerequisites/Corequisites:**

Course Completion of WWTR 120

**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: Principles and techniques used in advanced/tertiary wastewater treatment including disinfection, chlorination, odor control, wastewater reclamation, advanced sludge treatment and disposal, laboratory control methods, and the National Pollution Discharge Elimination System (NPDES) discharge requirements, report writing and records. Preparation for State Water

Resources Control Board (SWRCB) Wastewater Operator Certification Grade 2 exam. (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:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:

<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
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<b>CSU Transfer:</b>	Effective:	Inactive:
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<b>UC Transfer:</b>	Effective:	Inactive:
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**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Student Learning Outcomes:**

Upon completion of the course, students will 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 SWRCB (State Water Resources Control Board) Wastewater Operator Certification Grade 2 exam.
4. Prepare for the CWEA (California Water Environment Association) voluntary certification tests in Collection System Maintenance and Wastewater Treatment Plant Maintenance.

### **Objectives:**

During the course, students will:

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 waste water 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

### **II. Tertiary Treatment Processes**

- A. Types and their applications
- B. Operational parameters
- C. Methods of filtration
- D. Nitrification/denitrification
- E. Nutrient removal

### **III. Activated Sludge**

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

### **IV. Solids Handling and Disposal**

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

### **V. 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

### **VI. Types of Nutrient Removal Processes**

- A. Phosphorus
  1. Lime precipitation
  2. Alum flocculation
- B. Nitrogen
  1. Biological
  2. Chemical
  3. Physical

### **VII. Disinfection and Chlorination Methods**

- A. Chemical
- B. Other methods
- C. Test procedures
- D. Safety

### **VIII. Wastewater Reclamation**

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

### **IX. 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
- X. Overview of Instrumentation
  - A. Measurement and control systems
  - B. Principles of sensors/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. SCADA (Supervisory Control and Data Acquisition)
    - 2. Data collection and analysis
- XI. 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 CRC's (Cooperative Research Centers)
  - E. Occupational Health and Safety Administration (OSHA) requirements
- XII. Exam Preparation
  - 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: Wastewater treatment plant tour and observation report
5. Quizzes (10-15)
6. Midterm and 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 (observation report)
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Writing 10 - 20%
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**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems and project 1 (math problems)

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 and exams

Exams  
45 - 60%

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

Attendance and participation

Other Category  
0 - 10%

**Representative Textbooks and Materials:**

Advanced Waste Treatment. 3rd ed. Kerri, Kenneth. California State University of Sacramento, 1995 (classic)

Instructor prepared materials