Operation of Wastewater Treatment Plants, Volume 2
California State University, Sacramento
A—Treatment Plants and Tertiary Treatment
(3.5 Continuing Education Units)

COURSE DESCRIPTION

This course is designed to train operators in the practical aspects of operating and maintaining wastewater treatment plants, emphasizing safe practices and procedures. Information is presented on wastewater as a resource and its components; nitrogen and phosphorous removal processes as well as enhanced biological control; and methods used to remove solids from effluent, including physical–chemical treatment and a variety of filtration methods.

COURSE OUTLINE

The course uses selected chapters from the training manual, *Operation of Wastewater Treatment Plants,* Volume 2.

Chapter 1, Introduction to Wastewater Treatment

Learning Objectives

1. Describe various types of pollutants found in wastewater and explain the reasons to prevent discharging them, including regulatory prohibitions.
2. Describe wastewater collection, conveyance, and treatment systems.
3. Draw schematic plan layouts of typical wastewater treatment plants and list the major wastewater treatment processes and the purpose of each process.
4. Identify various methods of effluent discharge, reclamation, and reuse, as well as solids handling, disposal, and reuse.
5. Recognize safety hazards and take steps to eliminate them by corrective action.

The main purpose of this chapter is to give an overview of why and how wastewater is treated.

Chapter 2, Nutrient Removal (Tertiary Treatment)

Learning Objectives

1. Explain nitrogen and phosphorous removal systems, including nitrification, denitrification, luxury uptake, lime precipitation, and enhanced biological treatment.
2. Describe the safety, sampling procedures, and process control strategies associated with nitrogen and phosphorous removal systems.
3. Outline abnormal operating conditions, their causes, and corrective actions.

The main purpose of this chapter is to train operators in the basic operation and maintenance of nutrient removal systems at wastewater treatment plants.

Chapter 3, Solids Removal from Effluent (Tertiary Treatment)

Learning Objectives

1. Describe the proper procedures for using chemicals to remove solids from treatment plant secondary effluent.
2. Explain the operation of chemical feed equipment.
3. Identify and describe the components of gravity and pressure filters.

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4. Explain the operation of membrane filters.

The main purpose of this chapter is to train operators in the basic operation and maintenance of processes to remove solids from secondary effluent at wastewater treatment plants.

TIME ASSIGNMENT

Text pages: The content from the training manual used in this course, *Operation of Wastewater Treatment Plants*, Volume 2, includes 310 pages. The average word count on a page from the training manual is 525 words. The training manual used for this course contains text, tables, graphs, illustrations, math example problems, section questions, and chapter review questions to enhance the presentation of information and the student learning experience. The course is designed for students to spend the same amount of time reading the tables, graphs, and illustrations as they spend reading the equivalent amount of related chapter text. Therefore, each page is assumed to contain the equivalent of 525 words. The average reading speed is 130 words per minute; therefore, each page is projected to require 4 minutes of student time for each reading.

Math example problems: The course contains 28 math example problems. The projected average time to solve each math problem is 3 minutes.

Section questions: The course contains 184 section questions, located in the "Check Your Understanding" sections integrated throughout the chapter text. These questions enable students to self-assess their understanding of a section's material before proceeding to the next section. The projected average response time is 2 minutes per question.

Chapter review questions: The course contains 110 review questions, located in the "Chapter Review" at the end of each chapter. Question types include fill-in, multiple choice, and matching. The projected average response time is 2 minutes per question.

Objective test questions: The course contains 110 test questions. There is 1 objective test per chapter. The projected average response time is 2 minutes per question.

Course component	Number of component units		Minutes required to complete component unit		Total time assignment for component
Text pages	310	×	4	=	1,240
Math example problems	28	×	3	=	84
Section questions	184	×	2	=	368
Chapter review questions	110	×	2	=	220
Objective test questions	110	×	2	=	220
					2,132 minutes
					35.5 hours

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