

**Operation of Wastewater Treatment Plants, Volume 3**  
**California State University, Sacramento**  
**B—Instrumentation and Control and Introduction to Utility Management**  
**(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 using selected chapters from the training manual, *Operation of Wastewater Treatment Plants, Volume 3, 1<sup>st</sup> Edition*. Information is presented on process automation, instrumentation concepts and equipment, utility management topics including planning and organizing, solving problems and making decisions, workforce development, finance and funding, information management, asset management, communication, and resilience.

**COURSE OUTLINE**

This manual builds on the information offered in Volumes 1 and 2 to provide operators with the knowledge and skills to properly operate, maintain, and inspect wastewater treatment plant systems.

**Chapter 4, Instrumentation and Control**

*Learning Objectives*

1. Describe and explain the uses of automation and control systems within the wastewater treatment plant.
2. Understand and explain how measured values are taken and used by sensors and instruments.
3. Explain how sensors and instruments convert physical conditions into electrical outputs.
4. Read instruments and make proper adjustments in the operation of wastewater treatment facilities.
5. Identify symptoms of automated measurement and control system problems.

The main purposes of this chapter are to train operators in the concepts, equipment, and use of instrumentation systems in the operation of wastewater treatment plants.

**Chapter 5, Introduction to Wastewater Utility Management**

*Learning Objectives*

1. Identify a utility manager's core responsibilities and functions, and learn how to handle challenges.
2. Enact workforce development measures to best support utility employees, and plan for current and future staffing needs.
3. Oversee financial and asset management to guide the utility's financial, operational, and infrastructural health.
4. Recognize how and why a utility should communicate, both with internal stakeholders and with the public.
5. Apply principles of occupational safety, cyber security, and physical security to protect the utility against hazards and threats.

The main purpose of this chapter is to provide operators with an overview of the functions and responsibilities of wastewater treatment plant managers.

**TIME ASSIGNMENT**

**Text pages:** The content from the training manual used in this course, *Operation of Wastewater Treatment Plants, Volume 3*, includes 324 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 four minutes of student time for each reading.

**Math example problems:** The course contains 36 math example problems. The projected average time to solve each math problem is 3 minutes.

**Section questions:** The course contains 164 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 90 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 85 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	324 ×	4 =	1,296
Math example problems	36 ×	3 =	108
Section questions	164 ×	2 =	328
Chapter review questions	90 ×	2 =	180
Objective test questions	85 ×	2 =	170
			<b>2,082 minutes</b>
			<b>34.7 or 35 hours</b>