

Industrial Waste Treatment, Volume 1
B—Physical and Physical–Chemical Treatment and Treatment of Metal Wastestreams
California State University, Sacramento
(3.8 Continuing Education Units)

COURSE DESCRIPTION

This course is designed to train operators in the practical aspects of operating and maintaining industrial wastewater treatment facilities emphasizing safe practices and procedures. Information is presented on physical–chemical treatment methods; conditioning; gravity filtration; dissolved air flotation thickening; inert-media pressure filters; continuous backwash, upflow, deep-bed silica sand media filters; membrane filtration; biological aerated filters; air stripping; activated carbon adsorption; and metal wastestream treatment strategies and processes for removing common and complexed metals and recovering precious metals as well as applying flocculation, electrocoagulation, and other pollutant removal techniques.

COURSE OUTLINE

This course trains industrial waste treatment operators in the safe and effective operation of physical, physical–chemical, and chemical treatment processes used to remove metals and other contaminants from industrial wastestreams.

Chapter 5, Physical and Physical–Chemical Treatment Processes

Learning Objectives

1. Describe the components, process, principles behind, and use of physical–chemical treatment.
2. Describe the components, processes, and principles behind a range of filtration systems for wastewater treatment.
3. Describe the components, processes, principles behind, and uses of air stripping VOCs.
4. Describe the components, processes, principles behind, and uses of activated carbon adsorption.
5. Calculate dosing measures and performance metrics important to industrial wastewater treatment.

The main purpose of this chapter is to train operators in the safe and effective operation and maintenance of physical–chemical treatment processes, filtration systems, air stripping, and activated carbon adsorption.

Chapter 6, Treatment of Metal Wastestreams

Learning Objectives

1. Identify the sources of metal wastestreams.
2. Describe treatment methods used to treat metal wastes, including neutralization, metal precipitation, complexed metals removal, hexavalent chromium reduction, and destruction of cyanide by oxidation.
3. Collect, treat, and dispose of sludge generated by these treatment processes.
4. Perform startup, shutdown, operation, and maintenance duties safely at metal wastestream treatment facilities and troubleshoot and correct any problems that arise.
5. Describe the purpose of analytical laboratory support for treatment facilities and perform calculations for laboratory and field tests.

The main purpose of this chapter is to train operators in the safe and effective operation and maintenance of processes used to treat metal wastes as well as the collection, treatment, and disposal of sludge generated by these treatment processes.

TIME ASSIGNMENT

Text pages: The content from the training manual used in this course, *Industrial Waste Treatment*, Volume 1, includes 344 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 92 math example problems. The projected average time to solve each math problem is 3 minutes.

Section questions: The course contains 142 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 95 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 80 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	344 ×	4 =	1,376
Math example problems	92 ×	3 =	276
Section questions	142 ×	2 =	284
Chapter review questions	95 ×	2 =	190
Objective test questions	80 ×	2 =	160
			2,286 minutes
			38.1 hours