

College of Engineering

Department of Civil Engineering



## CE 448 Water and Wastewater Treatment

<b>Credit and Contact hours</b>	2 / 2 (Lectures), 1 (Tutorials), 0 (Laboratory)	
<b>Required, or Elective</b>	Required for a BSCE degree	
<b>Course Description</b>	<p>Fundamental principles and current practices in water processing, municipal wastewater treatment, and sludge processing. Characteristics of the surface, groundwaters, and municipal wastewater. Concepts and design of different unit operations and processes for the treatment of water/wastewater. Identifying the standards of drinking water, wastewater reuse and disposal criteria. Properties of sludge generated from treatment processes, treatment, and utilization. Field trips to water/wastewater treatment plants.</p>	
<b>Prerequisites or Co-requisites</b>	Engineering and Environment (GE 203) and Hydraulics (CE 324)	
<b>Course Learning Outcomes</b>	Students completing this course successfully will be able to	
	<b>Course Learning Outcomes</b>	<i>Related Student Outcomes (SO)</i>
	<b>CLO1.</b> Review standards for different physical, chemical, and microbiological quality parameters of water and wastewater.	<b>SO7</b>
	<b>CLO2.</b> Design water and wastewater treatment unit operations and processes considering public health requirements, social, environmental and economic factors.	<b>SO2</b>
<b>CLO3.</b> Evaluate different operational parameters of existing water and wastewater treatment units considering economic and environmental aspects (through a project)	<b>SO4</b>	
<b>Student Outcomes related to this Course</b>	<p><b>SO2.</b> an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. [ABET 1]</p> <p><b>SO4.</b> an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must</p>	

	<p>consider the impact of engineering solutions in global, economic, environmental, and societal contexts. [ABET 4]</p> <p><b>SO7.</b> an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. [ABET 7]</p>	
<b>Topics Covered</b>	<b>List of Topics</b>	<b>Related CLOs</b>
	1. Course introduction	CLO1
	2. Water chemistry and analysis	CLO1
	3. Parameters of water quality	CLO1
	4. Water sources and quality standards	CLO3
	5. Overview of water treatment processes	CLO2
	6. Coagulation, flocculation, and sedimentation processes	CLO2
	7. Softening process	CLO3
	8. Media filtration and membrane processes	CLO2
	9. Water disinfection process	CLO2
	10. Overview of wastewater treatment	CLO2
	11. Preliminary and primary wastewater treatment	CLO2
	12. Secondary wastewater treatment	CLO2
	13. Sludge characteristics and treatment	CLO3
<b>Textbook(s) and Other Required Material</b>	Hammer, M. J. Sr. and Hammer, M. J. Jr. "Water and Wastewater Technology. 6th Edition, Prentice Hall, 2007.	
<b>Grading System</b>	Two Mid-term exams	40 %
	Homework and Quizzes	10%
	Report	10%
	Final Exam:	40%
<b>Instructors</b>	Dr. Mohamed Abdelhalim Othman (2A94), email; <a href="mailto:maothman@ksu.edu.sa">maothman@ksu.edu.sa</a>	
<b>Date of Review</b>	October, 2020	