College of Engineering

Department of Civil Engineering

CE 547 Industrial and Hazardous Waste Management

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Required for a MSCE degree
Course Description	Definition and characteristics of industrial and hazardous wastes. Industrial and hazardous waste generation rates and prevention. Introduction to Industrial and hazardous waste collection, transportation, treatment, monitoring, and disposal. Applicable international, federal, and provincial regulations and initiatives. Municipal services and planning associated with industrial and hazardous waste management. Physical, chemical and biochemical treatment technologies, and disposal methods, including landfilling and incineration. Environmental impact of industrial and hazardous waste management.
Prerequisites or Co-requisites	None
Course Learning Outcomes	Students completing this course successfully will be able to

Course Learning Outcomes	***Related Program Outcomes***
CLO1: Recognize various industries that produce waste; sources, types, and characteristics of the waste, including industrial hazardous waste;	**K1**
CLO2: Recognize various technologies for physio-chemical, biological treatment of waste in liquid, solid and gaseous wastes	**K1**
CLO3: Recognize the concept of end of pipe treatment, and identify various types of major pollutant components in liquid, solid and gaseous wastes.	**K1**
CLO4: Explain the concept of clean Technology in industrial activities.	**K1**
CLO5: Determine the type and principles of the latest technologies in industrial & hazardous waste management;	**S1**
CLO6: Solve engineering and technological problems and design systems, processes, and components on environmental management efforts, including waste management.	**S1**
CLO7: Select and evaluate appropriate resources and utilize appropriate design tools and analysis for real life	**C2**

	environmental engineering projects and environmental management issues based on appropriate information and computing technology.
Student Outcomes related to this Course	**K1**. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems. **S1**. Provide solution for complex and real-life engineering problems through critical thinking and using modern engineering tools and identify its impact on social and ethical issues. **C2**. Design novel advanced Civil Engineering systems and evaluate its performance and effectiveness for engineering practice and its impact on society.
Topics Covered	

List of Topics	Related CLOs
1. Definition and characteristics of industrial and hazardous wastes.	**CLO1**
2. Fundamental of science and engineering principles applicable to industrial and hazardous wastes.	**CLO1**
3. Industrial and hazardous waste generation rates and prevention.	**CLO1**
4. Introduction to Industrial and hazardous waste collection, transportation, treatment, monitoring, and disposal.	**CLO3**
5. Environmental legislations related to prevention and control of industrial effluents and hazardous wastes.	
6. Municipal services and planning associated with industrial and hazardous waste management.	**CLO6**
7. Physical, chemical and biochemical treatment technologies, and disposal methods, including landfilling and incineration.	**CLO2**
8. Environmental impact of industrial and hazardous waste management.	**CLO7**

Textbook(s) and Other Required Material	1. Industrial Wastewater Management, Treatment and Disposal, WEF Manual of Practice No. FD-3, 3rd Edition, WEF Press and McGraw Hill, 2008. 2. Geoenvironmental Engineering: Site Remediation, Waste Containment and Emerging Waste Management Technologies, Hari D. Sharma and Krishna R. Reddy, John Wiley and Sons, Inc., 2004.
Grading System	Assignments 20% Research Work 20% Midterm Exam 20% Final Exam 40%
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