

Subject Description Form

Subject Code	CSE40432
Subject Title	Solid and Hazardous Waste Control
Credit Value	3
Level	4
Pre-requisites	Pre-requisites: CSE29371 Environmental Chemistry or CSE337 Water and Waste Management or CSE30337 Water and Waste Management Exclusion: CSE432 Solid and Hazardous Waste Control I
Objectives	To provide students with an understanding of the principles and applications of solid and hazardous waste control policy, management and technology.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply the fundamentals of applied science to formulate effective solutions for solid and hazardous waste management problem; b. exercise professional judgement in the assessment and evaluation of alternative solid and hazardous waste management options; c. present waste minimization ideas and arguments in formal presentations and informal discussions; d. function effectively and take responsibility in group projects; e. have the broad education necessary to understand the impact of waste management on the global and Hong Kong community.
Subject Synopsis/ Indicative Syllabus	Solid Waste 1. <u>Introduction</u> Solid waste management systems, terminology, and technical options; review of solid waste management strategy in Hong Kong and selected regions/countries. 2. <u>Generation of Solid Waste</u> Types and sources of solid waste, physical and chemical characteristics of municipal solid wastes; moisture content, density; heating value. 3. <u>Collection and Transfer of Waste</u> Collection type and methods; role and function of refuse transfer station; types of transfer stations; general layout and operational aspects of transfer stations; refuse collection and transport systems in Hong Kong.

	4. <u>Waste Treatment</u> Introduction to different types of commonly applied solid waste treatment methods, i.e., composting, incineration, and landfilling. Introduction of the more advanced biological treatment processes, adsorption, thermal treatment processes, and other waste-to-energy approaches such as anaerobic digestion and pyrolysis. Hazardous Waste 5. <u>Introduction</u> Hazardous waste management systems and options; environmental impacts and public concern of hazardous wastes; hazardous waste disposal strategy and associated legislation in Hong Kong. 6. <u>Toxicology Risk Assessment</u> Acute, sub-acute and chronic effects of toxic and hazardous materials; food chain contamination; assessment of exposure risk to hazardous materials to factory and sewage workers. 7. <u>Industrial and Hazardous Waste Sources</u> Defining categories and forms of industrial and hazardous solid and liquid wastes, sources of industrial and hazardous wastes, including specific characteristics of wastes from electroplating industries. 8. <u>Laboratory Work</u> Adsorption isotherms and its application for pollutants removal to adsorbent; toxicity characteristic leaching procedure. 9. <u>Team Project and Seminar</u> Perform literature review with teammates and present team projects on selected topics for waste treatment and management.
Teaching/Learning Methodology	Basic understanding of problems and techniques of control and management will be covered in the lectures. Students will be required to relate the lectured materials with real problems and practice basic engineering concepts for waste management. Laboratory work will provide students with basic analytical skill for identifying solid and hazardous wastes and will include toxicity characteristic leaching procedure and analysis of landfill leachate. Tutorials and/or site visit(s) will provide students related exercises to incorporate the learned knowledge into the real-world examples.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
			a	b	c	d	e
	1. Continuous assessment	30%	✓	✓	✓	✓	✓
	2. Examination	70%	✓	✓	✓	✓	✓
	Total	100%					
	Students must pass the final examination and achieve a passing overall score / grade to pass the subject. The students will be assessed with two components, i.e. (1) assignments, laboratory reports, and a team project, and (2) a final examination at the end of the semester.						
Student Study Effort Expected	Class contact:		Average hours per week				
	▪ Lectures / Tutorials / Laboratory		3 Hrs.				
	Other student study effort:						
	▪ Reading references and self study		3 Hrs.				
	▪ Project		2 Hrs.				
	▪ Assignment(s) and lab report(s)		1 Hr.				
	Total student study effort		9 Hrs.				
Reading List and References	Michael, D. LaGrega et. al., <i>Hazardous Waste Management</i> , 2 nd Ed., McGraw-Hill, 2001.						
	Tchobanoglous, G., Theisen, H. and Vigil, S.A., <i>Integrated Solid Waste Management</i> . McGraw-Hill, 1993.						
	Pichtel, John., <i>Waste Management Practices: Municipal, Hazardous, and Industrial</i> . Boca Raton, FL, CRC Press, 2005.						
	http://www.epd.gov.hk						