Subject Description Form

Subject Code	CSE520
Subject Title	Solid and Hazardous Waste Management
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Recommended background knowledge: It is expected that students should have a basic understanding of engineering mathematics, biology and chemistry.
Objectives	To provide students with knowledge of solid and hazardous waste management and control technologies.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. to apply the fundamental knowledge of solid and hazardous waste management concepts to formulate effective solutions for waste management problems relevant to collection, recycling, minimization, and disposal in Hong Kong; b. to identify and analyze various aspects arising the changing constraints that influence management and strategic projects, such as environmental sustainability, and technological considerations; c. to work with others in group works, and take responsibility for an agreed area of a shared activity; and d. generate creative and critical thinking and an ability to work independently.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** **i) Solid Waste** Introduction of Solid Waste Management Solid Waste Management hierarchy; solid waste disposal strategies in Hong Kong and other countries; functional elements of solid waste management system. Waste Generation Sources, classification and types of solid waste; composition and properties of waste; generation rates; engineering practices for physical and chemical analysis of solid wastes. Collection, Transfer and Transport of Waste

	Waste collection systems; basic functions and locations of transfer stations in Hong Kong; means of transport. Processing and Resource Recovery Techniques Physical, chemical and biological waste processing/treatment techniques, such as composting, anaerobic digestion; incineration and other waste-to-energy techniques; management and policy issues relating to waste recycling. Waste Disposal Options and Techniques Site selection, biological and chemical processes in a landfill; landfilling methods and operation; landfill gas generation and control; leachate collection system and treatments. **ii) Hazardous Waste** Hazardous Waste Generation Hazardous waste classification and types; generation of hazardous waste in Hong Kong; the environmental effects of hazardous waste. Toxicology and Risk Management Quantification of health effects of toxic compounds; route of entry and exposure concept; risk assessment of the toxic compound. Hazardous Waste Treatment Technologies Physical and chemical treatment technologies; stabilization and solidification techniques; biological treatment of organic wastes; chemical waste treatment centre in Hong Kong.
Teaching/Learning Methodology	Lectures will provide fundamental knowledge relating to solid waste and hazardous waste management, treatment and disposal in Hong Kong. Students will be required to undertake various coursework activities like calculation on solid waste properties and collection, and a project study. Tutorial will provide opportunities for students and lecturers to communicate and discuss problems on any exercise and examples, as well as demonstration of current real-world examples in Hong Kong or oversea cases. A laboratory work will provide students with opportunities to assess the toxicity test of a hazardous waste. Independent study and associate reading will be required for students to conduct a project study for a selected topic with oral presentation in group, so as to assess their abilities on critical and analytical thinking, and efforts on group communication and team work spirit.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a.	b.	c.	d.
1. Continuous Assessment	40%	✓	✓	✓	✓
2. Written Examination	60%	✓	✓		✓
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

"Continuous assessment" will be based on assignments (15%), a laboratory report (5%), and 1 term paper (20%).

"Written examination" is evaluated by final examination.

Students must attain at least Grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

Reading List and References

Textbooks

Chndrappa, R. and Brown, J., *Solid Waste Management: Principles and Practice (Environmental Science and Engineering)*, Springer (2012).

Worrell, W.A. and Vesilind P.A. Solid Waste Engineering, CL Engineering; 2nd Edition (2011).

LaGreaga, M.D., Buckingham, P.L. and Evans, J.C., *Hazardous Wastes Management*, McGraw-Hill International Edition, (1994).

Tchobanoglous, G., Theisen, H. and Vigil, S., *Integrated Solid Waste Management, Engineering Principles and Management Issues*, McGraw-Hill International Edition, (1993).