



UNIVERSITI TEKNOLOGI MARA

EVT637: SOLID WASTE ANALYSIS AND TECHNOLOGY

Course Name (English)	SOLID WASTE ANALYSIS AND TECHNOLOGY APPROVED
Course Code	EVT637
MQF Credit	3
Course Description	This course will interactively engage students cognitively and scientifically in areas of solid waste technology and its management. Students will state and explain concept of waste management and of the role and responsibilities of all involved from the waste production to ultimate disposal at the landfill, besides being introduced to various waste treatment technologies as well as techniques in monitoring the leachate produced in the landfill and the landfill gas, classified by their uses, perform investigations via fieldwork exercises and verbally and in writing, discuss the relationships with peers and facilitators. Lecture sessions employ a mixture of lectures and active learning (self and peer discussions). The outcomes shall be assessed through a variety of tools that include the traditional paper examination, laboratory reports, assignments, field visit report, presentation, mini project and classroom engagement.
Transferable Skills	Students will be able to write and present laboratory reports, analyse basic properties of solid waste. They will also capable to recommend the suitable waste management.
Teaching Methodologies	Lectures, Blended Learning, Lab Work, Case Study
CLO	<p>CLO1 Apply knowledge of management and legislative related to municipal solid waste, science in the design and management of waste generation, collection, transfer and disposal of solid waste.</p> <p>CLO2 Demonstrate the techniques relevant to the knowledge of solid waste properties and conversion.</p> <p>CLO3 Identify the technology to manage solid waste problem.</p> <p>CLO4 Evaluate the solid waste management and analysis knowledge and the advantages of various advanced disposal technologies or method through communication and investigation with team members in both fieldwork and classroom.</p>
Pre-Requisite Courses	No course recommendations
Topics	
1. Introduction to solid waste management 1.1) 1.1 Trend and development of waste management. 1.2) 1.2 Definition of waste. 1.3) 1.3 Definition of management: Integrated waste management, Sustainable waste. 1.4) 1.4 Functional element of solid waste management: collection, transportation, disposal.	
2. Institution, law and legal framework 2.1) 2.1 Waste regulations: National and International Law on Waste, Basel Convention, Environmental Quality Act 1974. 2.2) 2.2 The role of the waste stakeholders in the waste management industry.	
3. Waste generation and characterization 3.1) 3.1 Sources, composition and properties of solid waste. 3.2) 3.2 Physical, chemical and biological properties of MSW.	

4. Waste Handling and waste collection

- 4.1) 4.1 Waste collection systems: collect, bring, kerbside.
- 4.2) 4.2 Waste processing.
- 4.3) 4.3 Transport and vehicle routing.
- 4.4) 4.4 Transfer station.
- 4.5) 4.5 Types, siting and design criteria of transfer stations.

5. Waste transfer and transport

- 5.1) 5.1 Principles and design of Material Recovery Facilities.
- 5.2) 5.2 Types and objectives of material recovery systems.
- 5.3) 5.3 Principles, functions, equipment selection and comparisons, design criteria and operation of different material recycling processes.
- 5.4) 5.4 Integrated and specific recycling plants.
- 5.5) 5.5 Reuse, reduce and recycling.
- 5.6) 5.6 Composting and anaerobic digestion

6. Separation and processing and transformation of solid waste

- 6.1) 5.1 Principles and design of Material Recovery Facilities.
- 6.2) 5.2 Types and objectives of material recovery systems.
- 6.3) 5.3 Principles, functions, equipment selection and comparisons, design criteria and operation of different material recycling processes.
- 6.4) 5.4 Integrated and specific recycling plants.
- 6.5) 5.5 Reuse, reduce and recycling.
- 6.6) 5.6 Composting and anaerobic digestion.

7. Landfill technology

- 7.1) 6.1 Landfilling methods, operations and site selection.
- 7.2) 6.2 Design goals, basis and variables.
- 7.3) 6.3 Soil selection and design of landfill cover and drainage/liner systems.
- 7.4) 6.4 Design of landfill gas migration control and recovery systems.
- 7.5) 6.5 Design of leachate control and treatment systems.
- 7.6) 6.6 Other design variables (site layout, operation schedule, equipment selection, site selection, site preparation and construction, waste emplacement and compaction, closure and long-term care, end use alternative, etc.).

8. Alternative to Landfill

- 8.1) 7.1 Incineration.
- 8.2) 7.2 Pyrolysis.
- 8.3) 7.3 Gasification.
- 8.4) 7.4 Composting
- 8.5) 7.5 RDF
- 8.6) 7.6 MRF

Assessment Breakdown	%
Continuous Assessment	70.00%
Final Assessment	30.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	1 assignment throughout the semester	30%	CLO4
	Lab Exercise	Lab Reports	20%	CLO2
	Test	Test will cover half of the syllabus content	20%	CLO1

Reading List	Recommended Text	• Christensen, T.H 2011, <i>Solid Waste Technology and Management</i> , Wiley London
	Reference Book Resources	<ul style="list-style-type: none"> • Young, G.C 2010, <i>Municipal Solid Waste to Energy Conversion Processes: Economic, Technical and Renewable Comparisons</i>, Wiley New York • United Nations 2010, <i>Solid Waste Management in the World Cities: Water and Sanitation in the World Cities</i>, Earthscan London • Vesilind, P.A., Worrel, W. and Reinhart, D 2002, <i>Solid Waste Engineering</i>, Thomson Learning Brooks/Cole • Agamuthu, P. 2001, <i>Solid Waste: Principles and Management: With Malaysian Case Studies</i>, Institute of Biological Science, University of Malaya Press Kuala Lumpur • Williams, P.T. 2005, <i>Waste Treatment and Disposal. 2nd Edition</i>, John Wiley and Sons Ltd. West Sussex
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	