



**UNIVERSITI TEKNOLOGI MARA**

**EVT626: SOLID WASTE TECHNOLOGY AND MANAGEMENT**

<b>Course Name (English)</b>	SOLID WASTE TECHNOLOGY AND MANAGEMENT <b>APPROVED</b>
<b>Course Code</b>	EVT626
<b>MQF Credit</b>	3
<b>Course Description</b>	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, assignments, field visit report, presentation, mini project and classroom engagement.
<b>Transferable Skills</b>	Students are able to write and present reports related to waste technologies. They are also capable to recommend the right methods to manage and treat the solid wastes.
<b>Teaching Methodologies</b>	Lectures, Blended Learning, Field Trip, Presentation
<b>CLO</b>	<p>CLO1 Express an overall understanding of management and legislative related to municipal solid waste (PLO1, PLO3)(C2).</p> <p>CLO2 Apply knowledge of science in the design and management of waste generation, collection, transfer and disposal of solid waste (PLO1, PLO3)(C3).</p> <p>CLO3 3. Analyze the technology to manage solid waste problem (PLO1, PLO3,PLO6)(C4).</p> <p>CLO4 Evaluate the advantages of various advanced disposal technologies or methods through communication, writing, investigation with team members in both fieldwork and classroom (PLO1, PLO3,PLO6)(C6).</p>
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Introduction</b>	
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.	
<b>2. Institution, Law and Legal Framework</b>	
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.	
<b>3. Waste Generation and Characterization</b>	
3.1) 3.1 Sources, composition and properties of solid waste.	
3.2) 3.2 Physical, chemical and biological properties of MSW.	
<b>4. Waste Handling, Collection, Transfer and Transport</b>	
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. Separation and Processing and Transformation o Solid Waste**

- 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. Landfill Technology**

- 6.1) 6.1 Landfilling methods, operations and site selection.
- 6.2) 6.2 Design goals, basis and variables.
- 6.3) 6.3 Soil selection and design of landfill cover and drainage/liner systems.
- 6.4) 6.4 Design of landfill gas migration control and recovery systems.
- 6.5) 6.5 Design of leachate control and treatment systems.
- 6.6) 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.).

**7. Alternative to Landfill**

- 7.1) 7.1 Incineration.
- 7.2) 7.2 Pyrolysis.
- 7.3) 7.3 Gasification.
- 7.4) 7.4 Composting
- 7.5) 7.5 RDF
- 7.6) 7.6 MRF

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	n/a	10%	CLO1 , CLO2 , CLO3
	Test	n/a	20%	CLO1 , CLO2
	Visual Assessment	Field Visit	10%	CLO2 , CLO3
	Written Report	n/a	20%	CLO3 , CLO4

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"> <li>• Tchobanoglous, G., Thiesen, H. and Vigil, S.A 1993, <i>Integrated Solid Waste Management: Engineerin</i>, Ed., , McGraw-Hill, New Jersey [ISBN: ]</li> <li>• Vesilind, P.A., Worrel, W. and Reinhart,D. 2002, <i>Solid Waste Engineering</i>, Ed., , Thomson Learning. Brooks/Cole. [ISBN: ]</li> <li>• Williams, P.T. 2005, <i>Waste Treatment and Disposal</i>, 2 Ed., , John Wiley and Sons Ltd. West Sussex [ISBN: ]</li> <li>• Agamuthu, P. 2001, <i>Solid Waste: Principles and Management: With</i> , Ed., , University of Malaya Press. Kuala Lumpur [ISBN: ]</li> <li>• United Nations 2010, <i>Solid Waste Management in the World Cities: Water and Sanitation in the World Cities</i>, Earthscan London</li> <li>• Young, G.C 2010, <i>Municipal Solid Waste to Energy Conversion Processes: Economic, Technical and Renewable Comparisons</i>, Wiley New York</li> </ul>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	