



UNIVERSITI TEKNOLOGI MARA

EVT677: HAZARDOUS WASTE TREATMENT AND DISPOSAL

Course Name (English)	HAZARDOUS WASTE TREATMENT AND DISPOSAL APPROVED
Course Code	EVT677
MQF Credit	3
Course Description	This course is intended to provide students with the necessary background and knowledge pertaining to the hazardous waste treatments and disposal such as the study of the sources of generation, fate and reaction, characteristics of hazardous wastes and their regulation, handling, treatment (site remediation), disposal, site and risk assessment. Special emphasis is placed on physico-chemical, biological and thermal treatments, and landfill of hazardous waste.
Transferable Skills	Written report Presentation skill Team work Thinking scientific skill
Teaching Methodologies	Lectures, Blended Learning, Field Trip, Presentation
CLO	CLO1 Describe the characteristics of hazardous waste and basic regulations concerned with hazardous waste treatments and disposal CLO2 Apply the quantitative risk assessment in the hazardous waste treatments and disposal CLO3 Evaluate the various hazardous waste treatments and disposal including fate and reaction. CLO4 Present verbally the selected topics on hazardous waste.
Pre-Requisite Courses	No course recommendations
Topics	
1. Hazardous Waste : Introduction 1.1) 1.1 Definition 1.2) 1.2 Identification and classification 1.3) 1.3 Source of waste generation and hazardous properties	
2. Hazardous Waste : Legal framework 2.1) 2.1 The Environmental Quality Act 1974 (EQA) 2.2) 2.2 The Environmental Quality (Schedule Waste) Regulation 2005 2.3) 2.3 Basel Convention	
3. Hazardous wastes: minimization, prevention, reuse, recycle 3.1) 3.1 Concept of waste minimization and pollution prevention 3.2) 3.2 Concept of Green Chemistry 3.3) 3.3 Current practise hazardous waste and disposal in Malaysia	
4. Hazardous wastes: Reaction and Fate 4.1) 4.1 Hazardous waste in geosphere 4.2) 4.2 Hazardous waste in hydrosphere 4.3) 4.3 Hazardous waste in atmosphere 4.4) 4.4 Hazardous waste in biosphere	

5. Hazardous wastes : treatment methods

- 5.1) 5.1 Physical treatment
- 5.2) 5.1.1 Phase separation/ Sedimentation
- 5.3) 5.1.2 Filtration/ Centrifugation
- 5.4) 5.1.3 Membrane separation
- 5.5) 5.1.4 Solvent extraction
- 5.6) 5.2 Chemical treatment
- 5.7) 5.2.1 Neutralisation
- 5.8) 5.2.2 Oxidation
- 5.9) 5.2.3 Reduction
- 5.10) 5.2.4 Chemical precipitation
- 5.11) 5.2.5 Chemical extraction and leaching
- 5.12) 5.2.6 Ion-exchange
- 5.13) 5.2.7 Chemical dehalogenation
- 5.14)
- 5.15) 5.3 Stabilization and solidification
- 5.16) 5.4 Biological treatment
- 5.17) 5.4.1 In-situ Bioremediation
- 5.18) 5.4.2 Ex-situ Bioremediation
- 5.19)
- 5.20) 5.5 Thermal treatment
- 5.21) 5.5.1 Incineration
- 5.22) 5.5.2 Pyrolysis
- 5.23) 5.5.4 Gasification

6. Hazardous wastes : Disposal

- 6.1) 6.1 Landfill
- 6.2) 6.2 Surface impoundment
- 6.3) 6.3 Underground injection
- 6.4) 6.4 Leachate collection

7. Hazardous waste : Site Remediation

- 7.1) 8.1 Environmental impact and health risk
- 7.2) 8.2 Quantitative risk assessment processes
- 7.3) 8.2.1 Hazard identification
- 7.4) 8.2.2 Exposure assessment
- 7.5) 8.2.3 Toxicity assessment
- 7.6) 8.2.4 Risk characterization

8. Site visit

- 8.1) Hazardous waste treatment and disposal in industry

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Online Quiz	Online Quiz	10%	CLO1
	Presentation	Presentation	10%	CLO4
	Test	Test	40%	CLO2

Reading List	Recommended Text	Reference Book Resources
	<ul style="list-style-type: none"> • <i>LaGrega M.D., Buckingham, P.L, Evans J.C., 2001, The Environmental Resources Management Group Hazardous Waste Management</i> • Lawrence, K.W., Yung-Tse, H., Howard, H. L. and Constantine, Y. (2004). <i>Handbook of Industrial and Hazardous Wastes Treatment</i>. CRC Press. 2004, <i>Handbook of Industrial and Hazardous Wastes Treatment.</i>, CRC Press. 	<ul style="list-style-type: none"> • Santoleri, J.J., Reynolds, J. and Theodore, L 2004, <i>Introduction to Hazardous Incineration. 2nd Edition. John-Wiley, New York.</i> • Walter, Z.T 2003, <i>Physicochemical Treatment of Hazardous Wastes</i> • Environmental Quality Act 1974 (Act 127), <i>Subsidiary Legislation (current issues).</i> • Gordon A. L. and Louis, J.D. (1998). <i>Biological treatment of hazardous wastes. John-Wiley, New York</i> • Environmental Quality Act 1974 (Act 127) <i>Subsidiary Legislation (current issues).</i>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	