UNIVERSITI TEKNOLOGI MARA

EVT711: AIR POLLUTION CONTROL TECHNOLOGY

Course Name (English)	AIR POLLUTION CONTROL TECHNOLOGY APPROVED
Course Code	EVT711
MQF Credit	3
Course Description	This course deals with pollutant sources and their formation; atmospheric dispersion of pollutants; control of particulate and gaseous pollutants, volatile organic compounds, carbon monoxide, oxides of nitrogen and sulphur, etc. by techniques using devices such as filtration, scrubbers, condensers, electrostatic precipitators, incinerators, and absorption and adsorption units. Combustion related pollutants especially NOx and their control are also dealt with. Recent approaches to improve indoor air quality are also discussed.
Transferable Skills	1. Able to measure pollutant density 2. Able to identify suitable devices for pollution control
Teaching Methodologies	Lectures, Case Study, Discussion, Presentation
CLO	CLO1 Explain the trends in air pollution and control measures, strategies and technological control for air pollution (PLO1)(C2) CLO2 Apply the mechanisms and dynamics that lead to the formation and emissions of ambient and indoor air pollutants (PLO3)(C3) CLO3 Evaluate the appropriateness of air pollution technologies used to control emissions from combustion due to mobile and stationery sources in writing (PLO3)(C4) CLO4 Report the verbally and in writing the current issues in air pollution and control measures strategies and technological for controlling air pollution (A3)
Pre-Requisite Courses	No course recommendations

Topics
1. Overview of Concepts, sources, trends, control strategies, laws and re 1.1) 1.1 Introduction 1.2) 1.2 Law and Regulations and Criteria Air Pollutants 1.3) 1.3 Mercury and Radionuclides in Malaysia Regulations 1.4) 1.4 Hazardous Air Pollutants 1.5) 1.5 Effects of Air Pollutants 1.6) 1.6 Sources of Air Pollutants 1.7) 1.7 General Approaches to Air Emission Control 1.8) 1.8 Air Pollution Trends 1.9) 1.9 Concluding Remarks
2. Particle Dynamics and Deposition Mechanisms 2.1) 2.1. Particulate matter control legislation 2.2) 2.2. Characteristics of particles 2.3) 2.3. Particulate size distribution 2.4) 2.4. Particle Formation Mechanism 2.5) 2.5. Particle Collection Mechanisms 2.6) 2.6. Efficiency of Particle Collection 2.7) 2.7. Overview of particulate Control Equipment 2.8) 2.7.1. Gravity Settler 2.9) 2.7.2. Cyclone or mechanical separator 2.10) 2.7.3. Electrostatic precipitator (ESP) 2.11) 2.7.4. Fabric filter 2.12) 2.7.5. Wet scrubber 2.13) 2.8. Material and energy balance 2.14) 2.8.1. Case Study 1 – Scenario of coal-fired power generation plant

2.15) 2.9. Concluding Remarks
3. Control of Particulate Matter-technologies and devices 3.1) 3.1 Commonly used Methods for Air Pollution Control 3.2) 3.2 Particulate Matter Control 3.3) 3.3 General Methods for Control of Particulate Emissions 3.4) 3.4 Particulate Control Devices 3.5) 3.4.1 Gravity Settlers 3.6) 3.4.2 Cyclone or Mechanical Collectors 3.7) 3.4.3 Electrostatic Precipitators (ESP) 3.8) 3.4.4 Filtration (Fabric Filters) 3.9) 3.4.5 Wet Scrubbers 3.10) 3.5 Concluding Remarks
4. Principles of Control of Gases & vapours; Absorption, Adsorption, Cond 4.1) 4.1 Overview on Adsorption 4.2) 4.2 Absorption & Bio-filtration 4.3) 4.3 Oxidation & Reduction 4.4) 4.4 Condensation 4.5) 4.5 Case Study 2: Formation and Control of SO2 Emission 4.6) 4.6 Concluding Remarks
5. The formation of combustion-related pollutants, combustion stoichiom 5.1) 5.1 Introduction 5.2) 5.2 Nature of Fuel 5.3) 5.3 Combustion Stoichiometry & Fuels to air ratio 5.4) 5.4 Formation of pollutants in combustion processes 5.5) 5.5 Combustion formation CO 5.6) 5.6 Unburned Hydrocarbon (HC) 5.7) 5.7 Case Study 3 – Formation and Control of NOx 5.8) 5.8 Case Study 4 – Mobile Sources 5.9) 5.9 Concluding Remarks
6. Control of gases and vapours-technologies and devices 6.1) 6.1 Emission Control of Gases And Vapours 6.2) 6.1.1 Adsorption 6.3) 6.1.2 Absorption 6.4) 6.1.3 Oxidation 6.5) 6.1.4 Condensers 6.6) 6.2 Concluding Remarks
7. Managing Indoor Air Quality 7.1) 7.1 Indoor Air Quality and Control 7.2) 7.2 Common Indoor Air Pollutants 7.3) 7.3 Indoor General Control Methods 7.4) 7.4 Applicable Standards and Regulation 7.5) 7.5 Source Control and Ventilation 7.6) 7.6 Material Balance Model for IAQ 7.7) 7.7 Health Effects Due to IAQ 7.8) 7.8 Concluding Remarks

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	Assignment Report (Individual)	20%	CLO1
Group Project	Mini Project Report (Group)	20%	CLO3
Presentation	Mini Project Oral Presentation (Group)	20%	CLO4

Reading List

Recommended Text

- **Cooper, C.D., Alley, F. C. 2011, *Air Pollution Control*, Fourth Edition Ed., All, Waveland Press, Inc. USA [ISBN: 978-1-57766-6]**
- **Zhongchao Tan 2014, *Air Pollution and Greenhouse Gases*, First Edition Ed., all, Springer Singapore [ISBN: 978-981-287-2]**

Reference Book Resources

- **Nevers, N. D. 2000, *Air Pollution Control Engineering*, 2 edition Ed., All, McGraw-Hill USA [ISBN: 0-07-039367]**
- **Richard C. Flagan,John H. Seinfeld 1988, *Fundamentals of air pollution engineering*, 1st edition Ed., all, Prentice Hall USA [ISBN: 0-13-332537-7]**

Article/Paper List

Reference Article/Paper Resources

- **Meij, R., H. T. Winkel 2007, The Emission of Heavy Metals and Persistent Organic Pollutants from Modern Coal-Fired Power Stations, *Atmospheric Environment*, 41, 10**
- **Papastefanou 2010, Escaping Radioactivity from Coal-Fired power Plants (CPPs) due to Coal Burning and the Associated Hazards: a Review, *Journal of Environmental Radioactivity*, 101, 10**

Other References

This Course does not have any other resources