UNIVERSITI TEKNOLOGI MARA

EVT474: ATMOSPHERIC CHEMISTRY

Course Name (English)	ATMOSPHERIC CHEMISTRY APPROVED
Course Code	EVT474
MQF Credit	3
Course Description	This is an undergraduate course oriented to provide undergraduate students with the knowledge and skills for understanding and investigating the phenomenon of air pollution. The course covers the chemistry and dynamic of air pollutants, the sources as well as wide-ranging effects including effects on our bodies and the environment, fate and transport of air pollutants, the legislative framework for air pollution control strategies, air pollution meteorology and atmospheric dispersion modeling. A brief introduction of internal and government regulations related to air pollution problems will be explained. Any current air pollution issues will also be discussed in this course, from its sources to control and mitigation measures.
Transferable Skills	Students are able to solve the problem of air pollution through the identification of pollution's sources and formation of mechanism with applying of suitable technologies and regulations.
Teaching Methodologies	Lectures, Blended Learning, Discussion, Presentation
CLO	CLO1 Explain the knowledge and concept of relationship between sources and effects of air pollution problems. CLO2 Evaluate the understanding of meteorology factors and air pollution dispersion modeling in assisting to provide scientific and practical solutions to predict pollutant behaviors and concentrations. CLO3 Demonstrate effective written and verbal communication on selected air pollution problems.
Pre-Requisite Courses	No course recommendations

Topics
1. 1. Introduction to Air Pollution 1.1) 1.1 Classification of air pollutants, sources and types of air pollution problems. 1.2) 1.2 Effects of air pollution; human, animals, plants and environment. 1.3) 1.3 Prevention and reduction of air pollution problems; law, government and individual.
2. 2. Introduction to Basic Concepts in Air Pollution 2.1) 2.1 History of air pollution regulations 2.2) 2.2 Legislative Requirements: International and Malaysian Regulations, Guidelines, Standards and Protocols 2.3) 2.3 Gas laws and calculations, gas phase reactions. 2.4) 2.4 Solution and solubility of solids, gases and liquids encountered in air pollution; calculations of solubility. 2.5) 2.5 Units of measurements for air pollutant concentration.
3. 3. Urban Air Pollution 3.1) 3.1 Characteristics and mechanism of pollutant formation in combustion processes 3.2) 3.2 The motor vehicle emissions - prevention and reduction methods 3.3) 3.3 Emission factor and emission inventory 3.4) 3.4 Types of smog: Industrial smog and photochemical smog. 3.5) 3.5 Factors influence the formation of photochemical smog.
4. 4. Atmospheric Depositions 4.1) 4.1 Atmospheric cleansing processes 4.2) 4.2 Types of atmospheric depositions: wet and dry 4.3) 4.3 Acid depositions- formation dynamics and effects on the ecosystems

5. 5. Particles Characteristics and Dynamics 5.1) 5.1 Classifications, characteristics, size distribution, morphology and chemical compositions 5.2) 5.2 Formation mechanism 5.3) 5.3 Haze, visibility and health implications 5.4) 5.4 Stokes' Law, terminal settling velocity and calculations
6. 6. Fundamentals of Meteorology 6.1) 6.1 Meteorology disciplines. 6.2) 6.2 Compositions and thermal structures of atmosphere. 6.3) 6.3 Mechanisms of atmospheric transport and dispersion. 6.4) 6.4 Atmospheric stability, adiabatic and environmental lapse rate. 6.5) 6.5 Atmospheric stability and plume behaviors. 6.6) 6.6 Temperature inversion phenomenon and atmospheric circulation. 6.7) 6.7 Enhancing dispersion.
7. 7. Basic Air Pollution Modelling 7.1) 7.1 Gaussian Plume Model: assumptions and factors determine dispersion. 7.2) 7.2 Dispersion model. 7.3) 7.3 Mixing height and stack height. 7.4) 7.4 Calculation of pollutant from stack emissions.
8. 8.0 Air Pollution Problems 8.1) 8.1 Global warming, ozone depletion, trophospheric ozone, haze, indoor pollution. 8.2) 8.2 Sources, effects and prevention methods. 8.3) 8.3 Regulations and guidelines. 8.4) 8.4 Case study

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	Writing assignment (One assignment relates to Chapter 8)	10%	CLO3
Presentation	Oral presentation	10%	CLO3
Test	Relates to Chapter 1 to Chapter 4	40%	CLO1

Reading List

Recommended Text

- **Grant Ritchie 2017, *Atmospheric Chemistry*, 4 Ed., Wspc (Europe) [ISBN: 9781786341754]**

Reference Book Resources

- **Guy P. Brasseur,Daniel J. Jacob 2017, *Modeling of Atmospheric Chemistry*, Cambridge University Press [ISBN: 9781107146969]**
- **John H. Seinfeld,Spyros N. Pandis 2016, *Atmospheric Chemistry and Physics*, John Wiley & Sons [ISBN: 9781118947401]**
- **G. Tyler Miller,Scott Spoolman 2016, *Living in the Environment*, Cengage Learning [ISBN: 9781337094153]**
- **Richard C. Flagan,John H. Seinfeld, *Fundamentals of air pollution engineering* [ISBN: 0133325377]**
- **Zhongchao Tan 2014, *Air Pollution and Greenhouse Gases*, 1 Ed., Springer**

Article/Paper List: This Course does not have any article/paper resources

Other References: This Course does not have any other resources