



UNIVERSITI TEKNOLOGI MARA

EVT520: ENVIRONMENTAL CHEMISTRY

<b>Course Name (English)</b>	ENVIRONMENTAL CHEMISTRY APPROVED
<b>Course Code</b>	EVT520
<b>MQF Credit</b>	3
<b>Course Description</b>	This course will interactively engage students cognitively and scientifically in areas of the chemistry of the environment, atmosphere, water (aquatic), land (soil) and waste. Students will state, write and explain the concept, principles, and sources of atmospheric pollution (ozone layer, acid rain, smog, greenhouse effects, indoor air pollution, and toxic organic chemicals), aquatic pollution, soil pollution and waste chemistry. The chemistry, formation, and environmental effects of toxic organic chemical (chlorinated organic compounds; PCBs, dioxin, furan); and heavy metals in the environment will also be discussed. The designated lecture session is used to discuss pollution issues related to the environment, from its sources to control and mitigation measures. Lecture sessions employ a mixture of lectures and active learning (self and peer discussions). The outcomes shall be assessed through a variety of tools which include the traditional paper examination, tests, written assignment and oral presentation, and classroom engagement
<b>Transferable Skills</b>	Ability to: 1. outline the sources of pollution in the atmospheric (i.e. air, water and soil). 2. explain ozone layer that includes the chemistry (i.e. formation and destruction), its importance to life on the Earth and its depletion issues. 3. describe the conditions, sources, formation, components of smog, haze and acid rain. 4. identify indoor air pollutants and its sources. 5. define the greenhouse effect/global warming. 6. describe the sources of contamination for major toxic organic chemicals (i.e. PCBs, dioxins, furans, PAHs, and organochlorines). 7. state major aquatic pollutants and waste, and its sources of contamination. 8. discuss, assess, verify, compare and contrast the effects and the cycles of pollutants to the atmosphere, human and ecosystems. 9. explain the toxicity of Pb, Hg and Cd and its' routes of entry to the environment. 10. suggest ways to mitigate and control pollutants in the environment to remediate ozone depletion, acid deposition, smog, global warming, haze, and indoor air pollution.
<b>Teaching Methodologies</b>	Lectures, Blended Learning, Discussion, Presentation, Journal/Article Critique
<b>CLO</b>	CLO1 Describe the concept, principles, and sources of atmospheric pollution (ozone layer, acid rain, smog, greenhouse effects, indoor air pollution, and toxic organic chemicals), aquatic pollution, soil pollution and waste chemistry. CLO2 Explain the effects and the cycles of pollutants to the environment-atmosphere, water, soil, human and ecosystem. CLO3 Present environmental issues and suggest ways to mitigate and control pollutants in the environment. CLO4 Assess various sources of information and adopt the valid and accurate source of information.
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	<b>1. Introduction to spheres of environmental chemistry</b> 1.1) Chemistry of spheres of the environment <b>2. Stratospheric chemistry - the ozone layer</b> 2.1) The chemistry of ozone layer 2.2) The role of chemicals in the ozone layer 2.3) Ozone depletion and CFCs - Antarctica ozone hole <b>3. Tropospheric chemistry - Ground-level air chemistry and air pollution</b> 3.1) Process, origin and source of photochemical smog 3.2) Sources, formation, and effects of haze to the environment 3.3) Acid deposition - sources and ecological effects 3.4) Indoor air quality at workplace and home <b>4. The greenhouse effect and global warming</b> 4.1) The mechanism of greenhouse effect 4.2) Greenhouse gasses; substances that affect global warming <b>5. Toxic organic chemicals</b> 5.1) The different types of pesticides 5.2) Polychlorinated biphenyls, dioxin and furan 5.3) Polycyclic aromatic hydrocarbon <b>6. Heavy metals in the environment</b> 6.1) Lead 6.2) Cadmium 6.3) Mercury <b>7. Aquatic chemistry</b> 7.1) Sources of water pollution 7.2) Interaction with atmosphere, soil and other interfaces <b>8. Waste chemistry and solid waste management</b> 8.1) Waste generation; type of waste 8.2) Waste degradation, pollution and management 8.3) Soil pollution

Assessment Breakdown		%		
Continuous Assessment		100.00%		
Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Written assignment	20%	CLO4
	Presentation	Assignment presentation	20%	CLO3
	Quiz	Cumulative of 2 quiz	10%	CLO1
	Test	Cumulative of three test	50%	CLO2
Reading List	Recommended Text	Stanley E. Manahan 2009, <i>Environmental Chemistry</i> , 9th Ed., CRC Press Boca Raton [ISBN: 142005920]		
Article/Paper List	Recommended Article/Paper Resources	Latifah Abd Manaf, Mohd Armi Abu Samah, Nur Ilyana Mohd Zukki 2009, Municipal solid waste management in Malaysia: Practices and challenges, <i>Waste Management</i> , Vol 29, Issue 11, 2902 <a href="http://www.sciencedirect.com/science/article/pii/S0956053X08002766">http://www.sciencedirect.com/science/article/pii/S0956053X08002766</a> Ministry of Health Malaysia 2010, Drinking Water Quality Standard <a href="http://kmam.moh.gov.my/public-user/drinking-water-quality-standard.html">http://kmam.moh.gov.my/public-user/drinking-water-quality-standard.html</a> Engr. Zaki Zainudin 2010, Benchmarking River Water Quality in Malaysia, <i>Jurutera</i> , February 2010 <a href="http://irep.iium.edu.my/2954/1/Feature-BenchmarkingRiverWater3pp.pdf">http://irep.iium.edu.my/2954/1/Feature-BenchmarkingRiverWater3pp.pdf</a>		
Other References	<ul style="list-style-type: none"> <li>• Book Anil Kumar De 2009, <i>Environmental Chemistry</i>, New Age International, New Delhi</li> <li>• Website Kenneth L Barbalace 2015, <i>Environmental, Chemistry &amp; Hazardous Materials News, Careers &amp; Resources</i>, USA  <a href="http://environmentalchemistry.com/">http://environmentalchemistry.com/</a></li> <li>• Website Ministry of Natural Resources &amp; Environment, Malaysia 2015, <i>Official Portal of Department of Environment</i>, Putrajaya  <a href="http://www.doe.gov.my/portalv1/en/">http://www.doe.gov.my/portalv1/en/</a></li> </ul>			