UNIVERSITI TEKNOLOGI MARA

CHE515: INSTRUMENTAL CHEMISTRY FOR ENGINEERS

Course Name (English)	INSTRUMENTAL CHEMISTRY FOR ENGINEERS APPROVED
Course Code	CHE515
MQF Credit	3
Course Description	This is an advanced chemistry course. The topics covered concern the use of modern analytical methods in elucidating chemical compounds.
Transferable Skills	Knowledge Instrumental Analysis Skill
Teaching Methodologies	Lectures, Lab Work, Discussion
CLO	CLO1 Describe the most appropriate analytical method for structural determination and environmental heavy metal pollution assessment. CLO2 Analyze spectra and determine the functionality and structure of an unknown substance CLO3 Conduct experiment to achieve a predetermined goal
Pre-Requisite Courses	No course recommendations

Topics
1. Chapter 1:UV and Visible Spectroscopy 1.1) 1.1 Excitation and Absorption Laws: HOMO and LUMO 1.2) 1.2 Solvent Effects 1.3) 1.3 Chromophores, Conjugation, Shifting 1.4) 1.4 Electronic Transitions 1.5) 1.5 Interpreting Spectra 1.6) 1.6 Beer-Lambert Law 1.7) 1.7 Laboratory work : Identification of organic compounds using UV-Vis and IR spectroscopy.
2. Chapter 2: Infrared Spectroscopy 2.1) 2.1 FTIR Components (Interferometer) 2.2) 2.2 Molecular Vibrations and Absorption Frequencies 2.3) 2.3 Type of Samples 2.4) 2.4 Interpreting Spectra 2.5) 2.5 Hyphenated Methods Involving IR 2.6) 2.6 Applications 2.7) 2.7 Analysis (Quantitative and qualitative) 2.8) 2.8 Laboratory work : Identification of organic compounds using UV-Vis and IR spectroscopy
3. Chapter 3: Mass Spectroscopy 3.1) 3.1 Ions Productions (Readily volatile and Poorly Volatile) 3.2) 3.2 Relative Atomic Mass (RAM) 3.3) 3.3 Structural Information 3.4) 3.4 Ion Analysis 3.5) 3.5 Liquid Chromatography-Mass Spectrometry, and GC-MS
4. Chapter 4: Atomic Spectroscopy 4.1) Atomization Methods 4.2) 4.2 Atomic Absorption Spectroscopy (AAS) 4.3) 4.3 Atomic Emission Spectroscopy (ICP) 4.4) 4.4 Atomic Fluorescence Spectroscopy (AFS) 4.5) 4.5 Laboratory work: ICP determination of metal in waste water. 4.6) 4.6 Laboratory work: AAS determination of calcium in commercial supplement tablets

5. Chapter 5: Nuclear Magnetic Resonance 5.1) Nuclear Spin and Resonance 5.2) 5.2 Chemical Shift 5.3) 5.3 Factors Affecting Chemical Shifts 5.4) 5.4 1H-NMR (Splitting, Coupling, Integration of 1H-NMR Absorption) 5.5) 5.5 13C-NMR 5.6) 5.6 Laboratory work: NMR analysis of a constitutional isomer.
6. Chapter 6: Chromatography 6.1) 6.1 Chromatographic Techniques 6.2) 6.2 Theory of Column Efficiency in Chromatography 6.3) 6.3 Thin Layer Chromatography 6.4) 6.4 Gas Chromatography 6.5) 6.5 Liquid Chromatography

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	Assignment	30%	CLO2
Journal/Article Critique	Journal Analysis	20%	CLO3
Test	Mid-term Assessment	5%	CLO1
Test	Mid-term Assessment	5%	CLO2

Reading List

Recommended Text

- **Williams, D.H and Fleming, I 1995, *Spectroscopic Methods in Organic Chemistry*, 5 Ed., McGraw-Hill London**
- **Atkins, P. and de Paula , J., 2006, *Physical chemistry*, 8 Ed., Oxford University Press, Oxford**

Reference Book Resources

- **Yan, B., 2000, *Analytical Methods in Combinatorial Chemistry*, 1 Ed., CRC**

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

Other References: This Course does not have any other resources