



UNIVERSITI TEKNOLOGI MARA

CHM622: ORGANIC SPECTROSCOPY

Course Name (English)	ORGANIC SPECTROSCOPY APPROVED
Course Code	CHM622
MQF Credit	2
Course Description	This course deals primarily with the spectroscopic methods used for structure determination of organic compounds, namely, infrared spectroscopy (IR), nuclear magnetic resonance spectroscopy (NMR), ultraviolet-visible spectroscopy (UV-Vis) as well as mass spectrometry (MS) including hyphenated techniques. Instructional methods include lectures, problem-based learning and blended learning. The outcomes shall be assessed through a variety of tools which include quizzes, tests, assignments and final examination.
Transferable Skills	Structure elucidation of simple organic compounds
Teaching Methodologies	Lectures, Problem Based Learning (PBL), Presentation
CLO	<p>CLO1 Explain the basic theory of IR, UV-Vis, ¹H, ¹³C NMR and mass spectroscopy and describe each of their application in structure elucidation of organic compounds.</p> <p>CLO2 Elucidate chemical structures of organic compounds from the interpretation of conjoint IR-UV-NMR-MS spectra.</p> <p>CLO3 Elucidate structures of organic compounds from conjoint IR-UV-Vis-NMR-MS spectra Demonstrate communication skills in work collaboratively with peers and communicate effectively with instructor and peers on structure elucidation problems.</p>
Pre-Requisite Courses	No course recommendations
Topics	
1. Molecular Formulas 1.1) Index of Hydrogen Deficiency 1.2) Rule of Thirteen	
2. Applications of Infrared Spectroscopy 2.1) Correlation Charts and Tables 2.2) Approaching the Analysis of A Spectrum 2.3) A Survey of The Important Functional Groups with Examples 2.4) Factors That Influence the C=O Stretching Vibration 2.5) Infrared Problems	
3. Nuclear Magnetic Resonance (NMR) Spectroscopy 3.1) The NMR Phenomenon 3.2) Theory of NMR 3.3) Chemical Shift and its Measurement 3.4) Factors influencing Chemical Shift 3.5) Proton NMR Problems	
4. Carbon-13 NMR Spectroscopy 4.1) Principles 4.2) Carbon 13 NMR Problems	
5. Spin-spin Coupling 5.1) Coupling Constants 5.2) Tree Diagrams	

6. Mass Spectrometry

- 6.1) Basic Principles
- 6.2) Fragmentation
- 6.3) McLafferty Rearrangements
- 6.4) Mass Spectrometry Problems

7. UV-Vis spectroscopy

- 7.1) Principles of Electronic (UV-Vis) spectroscopy
- 7.2) Application of Electronic (UV-VIS) Spectroscopy

8. Conjoint IR-UV/VIS-NMR-Mass Spectrometry problems

- 8.1) n/a

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment and presentation	20%	CLO3
	Test	Test 1	20%	CLO1
	Test	Test 2	20%	CLO2

Reading List	Recommended Text	<ul style="list-style-type: none"> Donald Pavia, Gary Lampman, George Kriz, James Vyvyan 2008, <i>Introduction to Spectroscopy</i>, Fourth Ed., 9, Cengage Learning [ISBN: 9780495114789]
	Reference Book Resources	<ul style="list-style-type: none"> Phillip Crews, Jaime Rodríguez, Marcel Jaspars 2010, <i>Organic Structure Analysis</i>, Oxford University Press, USA [ISBN: 9780195336047] Douglas A. Skoog, F. James Holler, Stanley R. Crouch 2007, <i>Principles of Instrumental Analysis</i>, Brooks/Cole Publishing Company [ISBN: 9780495012016]
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	