



UNIVERSITI TEKNOLOGI MARA

CHM125: KIMIA ORGANIK ASAS

Course Name (English)	KIMIA ORGANIK ASAS APPROVED
Course Code	CHM125
MQF Credit	3
Course Description	This course is an introduction to the principles of basic organic chemistry that covers nomenclatures, structures, physical properties, isomers, bonding, stereochemistry, reaction types and uses of organic compounds. Functional groups that are going to be discussed include alkanes, alkenes, alkynes and alkyl halides.
Transferable Skills	Scientific skills
Teaching Methodologies	Lectures, Blended Learning, Demonstrations, Tutorial, Discussion
CLO	CLO1 Apply the knowledge of organic chemistry for specific chemical reactions & properties. CLO2 Conduct experiments independently as well as within a team based in areas of organic chemistry. CLO3 Display effective communications when discussing uses of organic compounds in industrial applications and living systems.
Pre-Requisite Courses	No course recommendations
Topics	
1. Carbon Compounds and Chemical Bonds 1.1) Structure of Carbon Compounds: Characteristic Features, Composition, Structure of Carbon, Carbocations and Carbanions 1.2) Hybridization, Atomic and Molecular Orbitals 1.3) Chemical Bonds: Ionic and Covalent Bonds 1.4) Polar and Nonpolar Molecules: Formal Charge and Delocalized Electrons 1.5) Intermolecular Forces	
2. Introduction to Organic Reactions 2.1) Definitions (Lewis, Bronsted-Lowry), Strength (K_a and pK_a), Nucleophile, Electrophile 2.2) Reactions and Mechanisms: Substitution, Elimination, Addition and Rearrangement 2.3) Homolysis and Heterolysis of Covalent Bonds, Homogenic and Heterogenic of Bonds	
3. Stereochemistry 3.1) Homolysis and Heterolysis of Covalent Bonds, Homogenic and Heterogenic of Bonds 3.2) Structural and geometric isomers: chain, position, functional groups, Cis-Trans, E-Z isomers 3.3) Optical Isomers: Chirality, Racemic Mixture, Enantiomer, Diastereomer, Specific Rotation and Configuration (R,S)	
4. Alkanes and Cycloalkanes 4.1) Structure, Physical Properties and Nomenclature 4.2) Synthesis of Alkanes: Hydrogenation of Alkenes and Alkynes, Reduction of Alkyl Halides 4.3) Reaction of Alkanes (Combustion of Alkanes, Halogenation of Alkanes: Chlorination of Methane Reaction with Mechanism) 4.4) Sources and uses of hydrocarbons	
5. Alkenes and Alkynes 5.1) Alkenes & Alkynes: Structure, Physical Properties and Nomenclature 5.2) Reactions and Mechanisms of Alkenes: [Synthesis: Elimination Reactions Dehydrohalogenation, Dehydration, Debromination], [Reactions: Addition Reactions and Markovnikov's and AntiMarkovnikov's Rule: Hydrohalogenation, Halogenation, Hydrogenation, Hydration (acid catalysed, Oxymercuration-demercuration, Hydroboration-oxidation), Epoxidation, Dihydroxylation and Oxidative cleavage] 5.3) Reactions and Mechanisms of Alkynes: [Synthesis: Elimination Reactions Dehydrohalogenation, Dehydration, Debromination], [Reactions: Addition of Hydrogen Halides and Halogens, Hydrogenation,	

Hydration (Mercuric Catalysed, Hydroboration-oxidation), Reaction of Terminal Alkynes]

6. Benzene & Aromaticity

- 6.1) Introduction: Benzene, Nomenclature; Structure and Stability; Huckel's Rule
- 6.2) Other Aromatic Compounds and Heterocyclic Aromatic Compounds
- 6.3) Electrophilic Aromatic Substitution and reaction mechanisms: Halogenation, Nitration, Sulfonation, Friedel-Craft's Alkylation and Acylation
- 6.4) Effect of Substituents groups on the benzene ring
- 6.5) Reactions of side chain of benzene: Oxidation of substituted benzene, Reduction of nitro group, Halogenation of alkyl benzene

7. Alkyl Halides

- 7.1) Structure and Physical Properties of Alkyl Halides
- 7.2) Nucleophilic Substitution Reactions: [Nucleophiles and Leaving Groups], [SN2 & SN1 Reaction: Kinetics, Mechanism and Stereochemistry]
- 7.3) Factors Affecting SN2 and SN1 Reactions
- 7.4) Elimination Reactions of Alkyl Halides: [E2 and E1 Reactions]
- 7.5) Substitution versus Elimination

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Assignment	20%	CLO3
	Practical	Practical	20%	CLO2
	Test	Test	20%	CLO1

Reading List	Recommended Text
	<ul style="list-style-type: none"> • Paula Yurkanis Bruice 2017, <i>Organic Chemistry</i>, Eight Edition Ed., Pearson Education Limited Essex, England [ISBN: 9781292160344] • John McMurry 2016, <i>Organic Chemistry</i>, 9th Edition Ed., Cengage Learning Asia Pte. Ltd. [ISBN: 9789814716284] • T.W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder 2016, <i>Organic Chemistry</i>, 12th Edition Ed., John Wiley & Sons Ltd [ISBN: 9781118875766] • Chang R., Goldsby K. 2014, <i>Chemistry</i>, 11th Edition Ed., McGraw-Hill Education [ISBN: 9789814599788] • Donald L. Pavia, Gary M. Lampman, George S. Kriz, Randall G. Engel 2017, <i>A Small Scale Approach to Organic Laboratory Techniques</i> 6th Edition Ed., Brooks Cole [ISBN: 9781305968349]

Article/Paper List	This Course does not have any article/paper resources
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Other References	
	<ul style="list-style-type: none"> • Website Chemistry LibreTexts / California State University 2020, <i>Chemistry</i>, MindTouch, Inc., California State, USA https://chem.libretexts.org/Bookshelves/Organic_Chemistry • Website Organic Chemistry 2020, <i>Chemistry</i>, American Chemical Society, Washington, USA https://www.acs.org/content/acs/en/caree rs/college-to-career/areas-of-chemistry/organic-chemistry.html • Website Organic Chemistry 2019, <i>Chemistry</i>, Khan Academy, India https://www.khanacademy.org/science/organic-chemistry • Website Jabatan Kimia Malaysia 2020, <i>Chemistry</i>, Kementerian Sains, Teknologi dan Inovasi, Malaysia https://www.kimia.gov.my/en/