



Paramedical program	
Specialization	Pharmacy
Course number	020805111
Course title	Organic Chemistry
Credit hours	3
Theoretical hours	2
Practical hours	3



Brief Course Description:

This course aimed to understand the most important functional group in organic compounds, their nomenclature, chemical reactions, identification, and the differences between their properties and how they react with each other, practice part aimed to know some techniques in organic chemistry like (separation , purification and organic synthesis)

Course Objectives:

Upon the completion of the course, the student will be able to:

1. distinguish carbon compounds from elemental compounds
2. classify organic compounds according to the functional groups
3. distinguish saturated organic compounds from unsaturated compounds
4. familiar with the methods of preparations of some important organic compounds and also their chemical reactions
5. familiar with different methods for identifications of organic compounds
6. Familiar of the industrial importance of some organic compounds.
7. Student must be able to separate , purify, and synthesis organic compound.

**Detailed Course Description:**

Unit number	Unit name	Unit content	Time needed
1.	Introduction	<ul style="list-style-type: none"> • Introduction of organic chemistry • Electrons Orbitals and hyperdization • Chemical Bonding and Valence • Lewis formulas and Kekulé formulas • Understanding Periodic table • carbon atom and its position in the periodic table • classification of organic compound. 	
2.	Aliphatic Hydrocarbons	<ul style="list-style-type: none"> ▪ Alkanes: <ul style="list-style-type: none"> ○ IUPAC Nomenclature ○ Physical properties ○ Alkyl groups ○ chemical reactions: (Halogenation, combustion reaction) ○ Cyclic Alkanes ▪ Alkenes and Alkynes: <ul style="list-style-type: none"> ○ Nomenclature ○ Physical properties ○ chemical reactions:(Addition reactions :H₂O, H₂, X₂,HX) (Markovinkov's Rule and Anti-Markovinkov's) ○ chemical test for saturation ○ Summary on petrol. ▪ Dienes ▪ briefing on natural rubber. 	
3.	Aromatic Hydrocarbons	<ul style="list-style-type: none"> ▪ Benzene : <ul style="list-style-type: none"> ○ structure ○ The Hückel Rule ○ Aromatic properties ○ Nomenclature of Benzene derivatives ○ Other Aromatic Compounds (Fused Ring Compounds) ○ Reactions of Benzene (Electrophilic aromatic substitution). 	



		<ul style="list-style-type: none"> ○ Activating and deactivating groups, directing groups. 	
4.	Alkyl and Aryl Halides	<ul style="list-style-type: none"> ○ Nomenclature ○ physical properties ○ chemical reactions: substitution reactions with (aqueous KOH, NH₃, AgNO₃, NaCN), elimination (Zitzeff rule), wartz and ulmar eactions, grignard reagent. ▪ briefing on insecticides (DDT) 	
5.	Alcohols, phenols and ethers	<ul style="list-style-type: none"> ▪ Alcohols: <ul style="list-style-type: none"> ○ Nomenclature ○ classification ○ physical properties ○ preparation of absolute ethanol. ○ Reactions of alcohols : <ul style="list-style-type: none"> ➤ (with metals Na, PX₅ and SOCl₂,) ➤ Substitution of the Hydroxyl H (ester formation) ➤ Substitution of the Hydroxyl Group (substitution by HX, HNO₃, H₂SO₄), ➤ Elimination of Water ➤ Oxidation and Reduction. ○ chemical tests (lucas, dichromate, victormayer) ▪ phenols.: <ul style="list-style-type: none"> ○ Aromatic substitution in phenols, ○ acidity of phenols ○ Differences between alcohols and phenols. ▪ Ethers and Epoxide: <ul style="list-style-type: none"> ○ Nomenclature ○ Preparing (diethyl ether) ○ ethers as solvents. 	



6.	Aldehydes and Ketones	<ul style="list-style-type: none"> ▪ Nomenclature ▪ physical properties. ▪ chemical reactions:: <ul style="list-style-type: none"> ○ Nucleophilic addition(H₂O, HCN,NH₃, RNH₂) ○ hydrazine, grignard reagent) ○ oxidation reduction reactions ▪ Methods of identification and how to differentiate between them(tollen's test) 	
7.	Carboxylic Acids and their derivatives	<ul style="list-style-type: none"> ▪ Carboxylic Acids: <ul style="list-style-type: none"> ○ Nomenclature ○ Physical properties ○ Acidity ○ chemical reactions <ul style="list-style-type: none"> ➤ Salt Formation ➤ Substitution of Hydroxyl Hydrogen ➤ Substitution of the Hydroxyl Group ➤ Reduction & Oxidation ▪ Esters: <ul style="list-style-type: none"> ○ Nomenclature ○ Fischer esterification, saponification, ammonolysis, ○ reduction of esters. halogens of acids:- preparation ○ (reaction of SO₂, PCl₅ with the carboxylic acid) – reactions: with(H₂O, ROH, NH₃) ▪ Acid anhydrides: <ul style="list-style-type: none"> ○ reactions with (H₂O, ROH, NH₃), Aspirin synthesis. ▪ Amides: <ul style="list-style-type: none"> ▪ Nomenclature, basicity, ▪ reactions (with H₂O, reduction). 	



8.	Amines	<ul style="list-style-type: none"> ▪ Nomenclature & Structure ▪ Physical properties ▪ Basicity of Nitrogen Compounds ▪ Acidity of Nitrogen Compounds ▪ preparation (alkylation of NH₃, reduction of nitrills, amides & nitro compounds) ▪ Reactions of Amines <ul style="list-style-type: none"> ○ Reactions: - with strong acids. ○ acylation and sulfonation of aromatic amines. ○ Hinesburg test for distinguishing amines ○ Reactions of amines with nitrous acid to form diazonium and coloring pigments (Azo dyes) 	
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Organic Chemistry: (Practical part)

Unit Number	Unit Name	Unit Content	Time Needed
	Separation of mixture of water / Acetone by	<ul style="list-style-type: none"> ▪ Simple distillation ▪ Fractional distillation 	
	Purification of iodine or Naphthalene by sublimation		
	Extraction of caffeine from tea leaves		
	Synthesis of Aspirin from salicylic acid		
	Determination of the melting point of the following organic compounds: salicylic acid, benzoic acid , urea, acetanilide, sodium benzoate		



Evaluation Strategies:

	Exams	Percentage	Date
	Mid Exam	30%	--/--/----
	Practical part	20%	--/--/----
	Final Exam	50%	--/--/----

Teaching language:

- English

Teaching Methodology:

- Lectures

Text Book and References:

1. H. Hart Organic chemistry 12th Ed Boston Houghton Mifflin company, 2007
3. Morrison and Boyd Organic chemistry Boston, London, Sydney, Toronto Allyn and Bacon, INC.
4. H. Hart laboratory manual Organic chemistry, A short course Boston Houghton Mifflin company, 2007