



Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy

QF02/0408–1.0

Department	Pharmacy
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Course Name	Pharmaceutical Organic Chemistry (1)	Course No.	201112
Prerequisite	General Chemistry(1)	Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

Intended Learning Outcomes	<p>The objectives of the course are to provide the students with the necessary knowledge and experience to be able to:</p> <ol style="list-style-type: none"> 1. Recognize the various functions groups or compound types in organic chemistry. 2. Organize organic structures by reference to organic nomenclature 3. Predict the chemical and physical properties of the compounds from its structure and formula. 4. Identify and apply the typical and characteristic reactions of organic functional groups. 5. Identify organic compounds of importance in environmental topics. 6. Identify and defend the likely organic reaction mechanisms. 7. Identify the absolute configuration of the organic compounds 		
Course Topics	<p>This course involves the bases of organic chemistry that include methods of preparation and reactions of alkanes, cycloalkanes, alkyl halides, unsaturated compounds (alkenes & alkynes), alcohols and ethers as well as Stereochemistry and Chiral molecules.</p>		
Text Books	<p>Chemistry, T.W.G. Solomons & C.B. Fryhle, John Wiley & Sons, 10th edition.</p>		
References	<p>1- Organic Chemistry By Morison & Boyd, 5th edition. 2- Organic Chemistry By John Mc Morry, 3rd edition.</p>		
Grade Determination	<input type="checkbox"/> 1 st Exam = 25% <input type="checkbox"/> 2 nd Exam = 25% <input type="checkbox"/> Final Exam = 50%	<input type="checkbox"/> Practical Course <input type="checkbox"/> Grade <input type="checkbox"/> Determination	<input type="checkbox"/> Course Work = 50% <input type="checkbox"/> (Reports, Term Papers, Quizes) <input type="checkbox"/> Final Exam = 50%
Course Outline			



Week	Hours	Subjects	Chapters in Textbook	Notes
1	1 1 1	<p><u>I. Introduction:</u></p> <ul style="list-style-type: none"> -Definition of organic chemistry , Representation of structural formulas . -Chemical formulas and isomers. - Chemical Bonds: Ionic and covalent bonds. - Formal charge and resonance. -Hybridization , Sigma and pi-bonds. 	1	Ref 1and2
2	1 1 1	<ul style="list-style-type: none"> - Classification of organic compounds (according to molecular framework and functional groups . Acid-base reactions.(Reactions and their mechanisms , Homolysis and heterolysis of covalent bonds - Definition of acids and bases , Carbocations and carbanions. 	2 3	Ref 1and2
3	1 1 1	<p><u>II. Alkanes and Cycloalkanes:</u></p> <ul style="list-style-type: none"> 1-2.Classification of hydrocarbons and introduction , Shape of Alkanes. 3-6. IUPAC Nomenclatures of Alkanes , Alkyl halides, Alcohols and other compounds 7. Physical properties. 8-Sigmabonds and bond rotation. 9. Conformations of ethane and Butane. 10.Relative Stabilities of Cycloalkanes. 	4	Ref 1and2
4	1 1 1	<ul style="list-style-type: none"> 11-13. Conformations of Cycloalkanes and Substituted Cycloalkanes.. Cis-TransIsomerism. 14.Bicyclic Alkanes . 15. Reactions of Alkanes. <ul style="list-style-type: none"> a- Halogenation b- Combustion c- Pyrolysis d- Insertion of methylene group 	4	Ref 1and2



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5	1	16. Preparations: a- Hydrogenation of alkenes b- Reduction of alkyl halides c- Coupling of alkyl halides with organometallic compounds d- Alkylation of terminal alkynes	5	Ref 1and2
	1	<u>III. Stereochemistry</u> Isomerism 1. Enantiomers and chiral molecules 2. Test for chirality and nomenclature of enantiomers (R-S) system		
	1	3. Naming of Enantiomers 4. Properties of enantiomers: optical activity. 5. Fischer Projection Formula.		
6	1	6. Diastereomers and meso compounds. 7. Stereoisomerism of Cyclic compounds. 8. Separation of Enantiomers	6	Ref 1and2
	1	<u>IV. Alkylhalides:</u> 1. Structure 2. Nomenclature 3. Physical properties		
	1	4. Preparations a- From alcohols b- Halogenation of certain hydrocarbons c- Addition of hydrogen halides to alkenes. d- Addition of halogens to alkenes and alkynes.		
7	1	5. Reactions: a- Nucleophilic substitutions (S_N1, S_N2).	6	Ref 1and2
	1	b- Eliminations (E1, E2)		
	1	<u>V. Alkenes and Alkynes I :</u> 7.1. Introduction Nomenclature and physical properties. 7.2. The E-Z System and cis-trans Isomerism. 7.3. Relative Stabilities of Alkenes. 7.4. Cycloalkenes		

8	1	7.5-7.7. Preparation of Alkenes : a- Dehydrohalogenation of alkyl halides b- Dehydration of alcohols c- Dehalogenation of vicinal dihalides d- Reduction of alkynes 7.10-7.12 Preparation of Alkynes a-Elimination Reactions , Dehydrohalogenation of alkyl halides . b- Alkylation of Alkynide Anion , Reaction of metal acetylides with primary alkyl halides .	7	Ref 1and2
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9	1	Alkenes and Alkynes II : a-Addition reactions of : Hydrogen,halogens,hydrogenhalides (Markovnikov and AntiMarkovnikov's Reactions) Addition of sulfuric acid, and water (dilute acid), halohydrin formation, dimerization, alkylation,oxymercuration-demercuration, hydroboration-oxidation, Addition of free radicals , carbenes, polymerization .	8	Ref 1and2
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Week	Hours	Subjects	Chapters in Textbook	Notes
10	1	b- Alcohols from Alkenes through Hydroboration – Oxidation: Anti Markovnikov Syn Hydration. c- Electrophilic Addition of Bromine and Chlorine to alkenes . d- Halohydrine Formation e- Oxidation of Alkenes: 1-Oxidation by cold KMnO_4 (syn hydroxylation) 2- Oxidation by hot KMnO_4	8	Ref 1and2
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11	1	3- Ozonolysis. f- Oxidation of Alkynes g- Diels-Alder reactions	8	Ref 1and2



11	1	<i>Alcohols, Ethers and Epoxides:</i> 1. Alcohols 1.1 Structure 1.2 Nomenclature 1.3 Physical properties	11and12	Ref 1 and 2
	1	Preparation of Alcohols a- From alkenes. b- Oxymercuration-demercuration		
12	1	c- Hydroboration-oxidation		Ref 1and2
	1	d- Grignard synthesis e- Hydrolysis of alkyl halides		
	1	f- Aldol condensation g- Reduction of carbonyl compounds h- Reduction of acids and esters i- Hydroxylation of alkenes		
13	1	Reactions of alcohols 1- Alcohols as acids. 2- Conversion into Mesylates and Tosylates.		Ref 1and2
	1	2. Ethers and epoxides 2.1 Ethers		
	1	a- Structure b- Nomenclature c- Physical properties		
14	1	Preparations of Ethers: a- Intermolecular Dehydration of Alcohols. b- Williamson synthesis.		Ref 1and2
	1	c- Acid catalyzed addition of alcohols to alkenes. Reaction of Ethers Cleavage by Strong Acids.		
	1	2.2 Epoxides a- Structure b- Nomenclature of epoxides		
15	1	Preparation of Epoxides: Epoxidation		Ref 1and2
	1	Reactions of Epoxides: a-Acid- Catalyzed Ring Opening Reactions.		
	1	b- Base - Catalyzed Ring Opening Reactions c-Anti Hydroxylation of Alkenes via Epoxides d-Crown ethers		



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16	2	Final Exam		
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Approved by Dept. Chair		Date of Approval	
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Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	
Office No.	
Extension Email	
Office hours	