Department	Pharmacy

Course Name	Pharmaceutical Organic Chemistry (1)	Course No.	201112
Prerequisite	104106	Credit Hours	3 hr
Number & date of course plan approval		Brief Description	See form QF02/0409

(Course Objectives)	The objectives of the course are to provide the students with the necessary knowledge and experience to be able to: 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	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.
Text Books	Chemistry, T.W.G. Solomons & C.B. Fryhle, John Wiley & Sons, 10th edition
References	1- Organic Chemistry By Morision & Boyd, 5th edition. 2- Organic Chemistry By John Mc Murry, 3rd edition.

Grade Determination	1st Exam=25% 2nd Exam=25% Final Exam= 50%	(Practical Course Grade Determination)	Course Work =50% (Reports, Term Papers, Quizes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes

01	**1** **1** **1**	**I. Introduction:** -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.	Ch 1	
02	**1** **1** **1**	- 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.	Ch 2 Ch 3	
03	**1** **1** **1**	**II. Alkanes and Cycloalkanes:** 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.	Ch 4	
04	**1** **1**	11-13. Conformations of Cycloalkanes and Substituted Cycloalkanes. Cis-Trans Isomerism 14.Bicyclic Alkanes **15. Reactions of Alkanes.**	Ch4	

	1	a- Halogenation b- Combustion		
05	1 1 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 **III.Stereochemistry** Isomerism 1. Enantiomers and chiral molecules 2. Test for chirality and nomenclature of enantiomers (R-S) system 3. Naming of Enantiomers 4. Properties of enantiomers: optical activity. 5. Fischer Projection Formula.	Ch5	
06	1 1 1	6. Diastereomers and meso compounds. 7. Stereoisomerism of Cyclic compounds. 8. Separation of Enantiomers **IV. Alkylhalides:** 1. Structure 2. Nomenclature 3. Physical properties	Ch6	
07	1 1 1	4. Reactions: a- Nucleophilic substitutions (S_N1,S_N2) b- Eliminations (E1, E2) **V. Alkenes and Alkynes I :** 7.1. Introduction 7.2. The E-Z System and cis-trans Isomerism 7.3.Relative Stabilities of Alkenes. 7.4. Cycloalkenes.	**Ch7**	
08		**7.5-7.7. Preparation of Alkenes :**		

	1 1 1	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 , Reactio of metal acetylides with primary alkyl halides .		
09	1 1 1	**Alkenes and Alkynes II :** a-Addition reactions of : Hydrogen,halogens,hydrogenhalides (Marcovnikov and AntiMarkovnikov's Reactions) Addition of sulfuric acid, and water (dilute acid), halohydrin formation, dimerization, alkylation,oxymercuration-demercuration, hydroboration-oxidation, Addition of free radicals	**Ch 8**	
10	1 1 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 $KMnO_4$		
11	1 1	3- Ozonolysis. f- Oxidation of Alkynes **VI. Alcohols, Ethers and**	**Ch**	

	1	**Epoxides**: **1. Alcohols** 1.1 Structure 1.2 Nomenclature 1.3 Physical properties **Preparation of Alcohols** a- From alkenes. b- Oxymercuration-demercuration	**11&12**	
12	**1** **1** **1**	c- Hydroboration-oxidation d- Grignard synthesis e- Hydrolysis of alkyl halides g- Reduction of carbonyl compounds h- Reduction of acids and esters i- Hydroxylation of alkenes		
13	**1** **1** **1**	**Reactions of alcohols** 1- Alcohols as acids. 2- Conversion into Mesylates and Tosylates. **2. Ethers and epoxides** 2.1 Ethers a- Structure b- Nomenclature c- Physical properties		
14	**1** **1** **1**	**Preparations of Ethers:** a- Intermolecular Dehydration of Alcohols. b- Williamson synthesis. **c-** Acid catalyzed addition of alcohols to alkenes. **Reaction of Ethers** Cleavage by Strong Acids. 2.2 Epoxides a- Structure b- Nomenclature of epoxides		
15	**1**	**Preparation of Epoxides:** **Epoxidation** **Reactions of Epoxides:**		

	1 1	a-Acid- Catalyzed Ring Opening Reactions. b- Base - Catalyzed Ring Opening Reactions c-Anti Hydroxylation of Alkenes via Epoxides		
16		Final Exam		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	
Office No.	
Extension **Email**	
Office hours	