

<b>INSTITUTE</b>	<b>FACULTY OF PHARMACY</b>
<b>PROGRAM</b>	<b>BACHELOR OF PHARMACY</b>
<b>SEMESTER</b>	<b>2</b>
<b>COURSE TITLE</b>	<b>PHARMACEUTICAL ORGANIC CHEMISTRY-I</b>
<b>COURSE CODE</b>	<b>13PH0202</b>
<b>COURSE CREDITS</b>	<b>6</b>

**Objective:**

- 1 This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Write the structure, name and the type of isomerism of the organic compound
- 2 Write the reaction, name the reaction and orientation of reactions
- 3 Account for reactivity/stability of compounds
- 4 Identify/confirm the identification of organic compound

**Pre-requisite of course:** write the structure, name and the type of isomerism of the organic compound

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	1	4	75	15	10	35	15

Contents : Unit	Topics	Contact Hours
1	<p><b>Classification, nomenclature and isomerism</b>            Classification, nomenclature and isomerism: 7 Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds) Structural isomerisms in organic compounds, Alkanes*, Alkenes* and Conjugated dienes*: SP hybridization in alkanes, Halogenation of alkanes, uses of paraffins, Stabilities of alkenes, SP hybridization in alkenes, E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement, Alkyl halides*: SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform Alcohols*- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol??, Carbonyl compounds* (Aldehydes and ketones): Nucleophilic addition Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde??, Carboxylic acids*: Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids ,amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid Aliphatic amines* - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine??</p>	7
2	<p><b>Alkanes*, Alkenes* and Conjugated dienes*</b>            SP hybridization in alkanes, Halogenation of alkanes, uses of paraffins, Stabilities of alkenes, SP hybridization in alkenes, E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement</p>	10

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
3	<b>Alkyl halides</b> SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform Alcohols*- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol	10
4	<b>Carbonyl compounds* (Aldehydes and ketones):</b> Nucleophilic addition, 10 Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde	10
5	<b>Carboxylic acids</b> Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid Aliphatic amines* - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine	8
<b>Total Hours</b>		<b>45</b>

#### Suggested List of Experiments:

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Pharmaceutical Organic Chemistry I</b> Experiment-1, Experiment-2, Experiment-3, Experiment-4, Experiment-5, Experiment-6, Experiment-7, Experiment-8, Experiment-9, Experiment-10, Experiment-11, Experiment-12, Experiment-13	60
2	<b>Pharmaceutical Organic Chemistry I</b> Tutorial-1, Tutorial-2, Tutorial-3, Tutorial-4, Tutorial-5, Tutorial-6, Tutorial-7, Tutorial-8, Tutorial-9, Tutorial-10, Tutorial-11, Tutorial-12, Tutorial-13, Tutorial-14, Tutorial-15	15
<b>Total Hours</b>		<b>75</b>

#### Textbook :

- 1 Textbook of Organic Chemistry, Brian S. Furniss et. al., Pearson Education, 2015
- 2 Advanced Practical Organic Chemistry, N.K. Vishnoi, S Chand, 2010
- 3 Introduction to Organic Laboratory Techniques: A Microscale Approach, Pavia, Lampman and Kriz, Brooks/Cole, 2007

**Textbook :**

- Organic Reaction Mechanisms, V. K. Ahluwalia, Rakesh Kumar Parashar, Alpha Science International Ltd, 2006
- Textbook of Organic Chemistry, V. K. Ahluwalia, Rakesh Kumar Parashar, Viva Books, 2021
- Textbook of Organic Chemistry, B.S. Bahl & Arun Bahl., S. Chand, 2019
- Organic Chemistry, P.L Soni, Sultan Chand & Sons, 2012
- Practical Organic Chemistry, Mann & Saunders, Pearson Education India, 2009

**References:**

- Organic Chemistry, Organic Chemistry, Jonathan Clayden, Nick Greeves, and Stuart Warren, Oxford University Press, 2014
- Organic Chemistry, Organic Chemistry, Morrison and Boyd, Pearson Education India, 2010
- Organic Chemistry, Organic Chemistry, I. L Finar, ELBS, 1985

**Suggested Theory Distribution:**

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	30.00	25.00	15.00	10.00	0.00

**Instructional Method:**

- The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by the blackboard may also use any tools such as demonstration, role play, quiz, brainstorming, MOOCs etc.
- The internal evaluation will be done based on continuous evaluation of students in the laboratory and classroom.
- Students will use supplementary resources such as online videos, NPTEL videos, MOOCs/ e-courses, virtual laboratories.