

School of pharmacy

Department Medicinal Chemistry

Course title: Organic Chemistry II

Credit (Theory or Practical): 3 Credits (Theory)

Prerequisite: Organic Chemistry 1

Course Lecturers: Dr. Azizian, Dr. Asadi, Dr. Mirfazli

Responsible Lecturer: Dr. Azizian

Course Description:

- Course objectives:

This course is designed to provide a fundamental overview of organic chemistry to students interested in pursuing a career in the sciences. Upon successful completion of this class, students will understand the relationship between structure and function of molecules, the major classes of reactions, reaction energetics and mechanisms, synthesis of organic compounds. As one of the Natural Sciences, chemistry has evolved out of careful observation and experimentation; as technology evolves, so does the body of chemical knowledge. This course will integrate relevant technological advances and their impact in the formulation of chemical principles and their applications. Furthermore, the laboratory component of the course will help to illustrate and apply some of these technological advances.

Organic chemistry provides the student with the necessary background to understand the chemistry of carbon-containing compounds. Topics will include structure, stereochemistry, nomenclature, synthesis, properties, and reactions of the major classes of organic compounds. A non-mathematical, mechanistic approach is used in the course to explain the reactions of these compounds.

The course consists of several interactive lectures about the organic compound synthesis.

Student Learning Objectives:

1. Analyze the structure of organic compounds by recognizing main functional groups, naming the compounds using the I.U.P.A.C. system, and predicting their properties using the type of bonding, hybridization state, intermolecular forces and stereochemistry;
2. Describe mechanisms of reactions: nucleophilic substitution, elimination and electrophilic addition, and apply this knowledge to predict the major product in organic reactions, such as those involving alcohols, alkyl halides, amines, carbonyl compounds, aldehydes, ketones, carboxylic acid and derivatives.

3. Analyze the nature of a reagent: as a nucleophile, free radical, or electrophile and use this knowledge to propose the synthesis of organic compounds, such as a hydrocarbon, alkyl halides, alcohols, or alkenes; and
4. Demonstrate proficiency in organic laboratory skills as they pertain to: chemical information, safe handling, use and disposal of organic compounds; synthetic procedures, including isolation, purification, and use of instrumentation.

This course will require the student to integrate information, solve problems and engage in authentic inquiry to achieve these ends.

Students are expected to:

1. Recognize main functional groups in organic compounds;
2. Name organic compounds using the I.U.P.A.C. system;
3. Analyze the structure of a given compound and predict the type of bonding, hybridization state, and effect of the structure on the physical properties of such a compound;
4. Recognize nucleophiles, electrophiles and their reactivity, in order to predict the course of a reaction;
5. Write and understand mechanisms for the different types of organic reactions: free radical, nucleophilic substitution, elimination, and electrophilic addition;
6. Predict the major product in an organic reaction, such as those involving hydrocarbons, alcohols, alkyl halides, and alkenes, by applying the knowledge of reaction mechanisms;
7. Write a scheme for the synthesis of different classes of organic compounds, such as hydrocarbons, alcohols, alkyl halides, and alkenes;
8. Construct models of all the important classes of compounds, and predict their optical and structural isomers;
9. Standardize and operate laboratory instruments to identify reactants and products and to separate mixtures of compounds;
10. Obtain information about chemical compounds from all possible reference sources; apply this information for the safe handling, use and disposal of such compounds in a safe and environmentally responsible manner;
11. Work as a member of a team in solving classroom problems and in the laboratory;
12. Use appropriate current technology in the laboratory to obtain data; and
13. Understand the impact that recent technology has on the field.

Organic Chemistry II Course Plan (M-Pharm)

Monday 10-13

	Subject	Lecturer	Date
1	Alcohols; Structure, Properties, Preparation	Dr. Azizian	7-03
2	Alcohols; Reactions	Dr. Azizian	7-10
3	Ethers and Epoxides	Dr. Azizian	7-17
4	Aldehyde and ketones; structure, properties, preparation	Dr. Azizian	7-24
5	Aldehyde and ketones; Reactions	Dr. Azizian	8-01
6	Solving problem	Dr. Azizian	8-08
7	Amines	Dr. Asadi	8-15
8	Midterm Exam (1-6)		8-22
9	Amine-Heterocycles	Dr. Asadi	8-29
10	Heterocycles	Dr. Asadi	9-06
11	Solving problem	Dr. Asadi	9-13
12	Carboxylic acid and nitriles	Dr. Mirfazli	9-20
13	Carboxylic acid derivatives	Dr. Mirfazli	9-27
14	Alpha substitution reactions	Dr. Mirfazli	10-04
15	Carbonyl condensation reaction	Dr. Mirfazli	10-11
16	α , β - unsaturated carbonyl compound	Dr. Mirfazli	10-18
17	Solving problem	Dr. Mirfazli	10-25

References:

- 1- Mc. Murry, J. Organic Chemistry, 8th ed., Books/cole Publishing Company; 2012.
- 2- Wade, L.G. Organic Chemistry; 8th ed.; Prentice- Hall Inc.; 2013.
- 3- Morrison, R.T.; Boyd, R.N. Organic Chemistry; 6th ed.; Prentice Hall; 1992.
- 4- Solomons, T.W.G. Organic Chemistry; 5th ed.; John Wiley and Sons Inc.; 1992.
- 5- Volhardt, K.P.C. Organic Chemistry; Wh Freeman; 2006.

Assessment Methods for Course Learning Goals

Contents	Score	Percent
Midterm Exam (1-6)	6	30
Final exam (7-18)	11	55
Class activity	3	15

Contents	Class activity	Midterm	Final exam	Final Score
Dr. Azizian	1.15	6.35	-	7.5
Dr. Asadi	0.75	-	4..25	5
Dr. Mirfazli	1.15	-	6.35	7.5