

School of Pharmacy

Department of Medicinal Chemistry

Course title: Organic Chemistry II

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

Prerequisite: Organic Chemistry I

Course Lecturers: Dr. Mokhtari, Dr. Asadi, Dr.Golsanamlou

Responsible Lecturer: Dr. Mokhtari

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 energies and mechanisms and 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 compounds 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 aromatic compounds, amines, 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 aromatic compounds, amines, aldehydes, ketones, carboxylic acid and derivatives.
4. Demonstrate proficiency in organic laboratory skills in the following: chemical information, safe use, handling, and disposal of chemicals; synthesis processes include isolation, purification and the use of chemistry laboratory instruments.
5. 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 aromatic compounds, aldehydes, ketones, carboxylic acids, amines and heterocycles by applying the knowledge of reaction mechanisms;
7. Write a scheme for the synthesis of different classes of organic compounds, such as aromatic compounds, aldehydes, ketones, carboxylic acids, amines and heterocycles,
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)

Wednesdays 10-13

	Subject	Lecturer	Date
1	Aromatic Compounds	Dr. Mokhtari	17.11.1403
2	Reactions of Aromatic Compounds	Dr. Mokhtari	24.11.1403
3	Solving problem	Dr. Mokhtari	01.12.1403
4	Aldehyde and ketones; structure, properties, preparation	Dr. Mokhtari	08.12.1403
5	Aldehyde and ketones; Reactions	Dr. Mokhtari	15.12.1403
6	Solving problem	Dr. Mokhtari	22.12.1403
8	Carboxylic acid and nitriles	Dr. Golsanamlou	20.01.1404
9	Carboxylic acid derivatives	Dr. Golsanamlou	27.01.1404
10	Alpha substitution reactions	Dr. Golsanamlou	03.02.1404
11	Midterm Exam (1-6)		10.02.1404 10-11:30
12	Carbonyl condensation reaction	Dr. Golsanamlou	10.02.1404
13	α , β - unsaturated carbonyl compound	Dr. Golsanamlou	17.02.1404
	Solving problem	Dr. Golsanamlou	24.02.1404
14	Amines	Dr. Asadi	31.02.1404
15	Amine-Heterocycles	Dr. Asadi	07.03.1404
16	Heterocycles	Dr. Asadi	21.03.1404
17	Solving problem	Dr. Asadi	21.03.1404 (13-15)

References:

- 1- Mc. Murry, J. Organic Chemistry; 10th ed., Books/cole Publishing Company; 2023.
- 2- Wade, L.G. Organic Chemistry; 9th ed.; Prentice- Hall Inc.; 2015.
- 3- Morrison, R.T.; Boyd, R.N. Organic Chemistry; 6th ed.; Prentice Hall; 1992.
- 4- Klein, David R. Organic Chemistry. 3rd ed.; John Wiley & Sons; 2017.

Assessment Methods for Course Learning Goals

Contents	Score	Percent
Midterm Exam (1-6)	7.5	37.5
Final exam (7-18)	12.5	62.5

Class activity	2	10
----------------	---	----

Contents	Class activity	Midterm	Final exam	Final Score
Dr. Mokhtari	0.75	6.75	-	7.5
Dr. Golsanamlou	0.75	-	6.75	7.5
Dr. Asadi	0.5	-	4.5	5