

## Course Specifications : organic Chemistry

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**University** : Benha university

**Faculty** : Faculty of Engineering

**Department** Energy

### 1- Course Data

Course Code :	Course Title :	Study Year:
EMP 301	Organic Chemistry	2 (level3)
Specialization: Energy		
Teaching Hours:		
Lecture : 2	Tutorial : 2	Practical : 0

### 2- Over all aim of Course

The primary goal of this course is to understand organic chemistry and to develop critical thinking skills related to the subject matter. The specific objectives are:

- 2.1 To acquire the student with the essential knowledge to understand the basic principles of organic chemistry which are necessary for engineering students.
- 2.2 To differentiate between organic and inorganic compounds.
- 2.3 To be familiar with the nomenclature, properties and reactions of hydrocarbons and their derivatives.
- 2.4 To learn the different types of hybridization and their related geometries.
- 2.5 To understand the three-dimensional shapes of simple organic molecules and differentiate between its different isomers (structural and stereo), and how those shapes affect reactivity.
- 2.6 To relate the relationship of a molecule's structure with its reactivity
- 2.7 To differentiate between the different types of reactions and evaluate their mechanism.

### 3- Intended Learning Outcomes of Course (ILOS)

#### a- Knowledge and Understanding

**By the end of this course the students:**

- a<sub>1</sub> - To be familiar with the nomenclature, properties and reactions of hydrocarbons and their derivatives.
- a<sub>2</sub> - To understand and differentiate between organic and inorganic compounds.
- a<sub>3</sub>- To learn about the empirical and molecular formula.
- a<sub>4</sub>- To differentiate between the different types of hybridization and their related geometries
- a<sub>5</sub>- To differentiate between the different types of reactions and evaluate their mechanism.
- a<sub>6</sub>. identify all the isomers associated with simple aliphatic hydrocarbons and predict

#### b- Intellectual Skills

**By the end of this course, the students will be able to:**

- b<sub>1</sub>- To organize the compounds as organic and inorganic.
- b<sub>2</sub>. To calculate the empirical and molecular formula and predict the molecular structure of a chemical organic compound.
- b<sub>3</sub>- To recognize stereochemistry and be able to apply the Fischer projection to designation of stereochemistry (R/S and cis/trans)
- b<sub>4</sub>- To calculate the heat of combustion of an organic compound.
- b<sub>5</sub>. To predict the geometries and structures of carbon-based compounds, the tetravalence of carbon atoms, and the local geometries that result from sp, sp<sup>2</sup>, and sp<sup>3</sup> hybridization.
- b<sub>6</sub>- To relate the relationship of a molecule's structure with its reactivity

### c- Professional and practical Skills

**On completing this course, the students are expected to be able to:**

- c<sub>1</sub>. Draw skeletal structures for organic compounds.
- c<sub>2</sub>. Draw valence bond and Lewis dot structure for organic species, including formal charges.
- c<sub>3</sub>. To construct three-dimensional models of the organic compounds

### d- General and practical Skills

**by the end of this course, the students will be able to:**

- d<sub>1</sub>- Manage the time effectively
- d<sub>2</sub> - Use different resources to get the required knowledge and information.
- d<sub>3</sub>- Collaborate effectively within multidisciplinary team.
- d<sub>4</sub>- Develop the ethical behaviors between students and staff members as well as among the students themselves.

## 4- Course Contents

No.	Topics	No of hours	Lecture	tutorial
1	Types of hydrocarbons and their derivatives	8	√	√
2	Molecular composition and structure of organic compounds: determination of empirical and molecular formula	8	√	√
3	Types of Hybridization and related geometry	8	√	√
4	Types of stereoisomers: enantiomers and diastereomers and their properties	8	√	√
5	Types of reactions: elimination –addition – substitution	8	√	√
6	Organic reaction mechanism: bond formation & fission, classification of reagents and reactions, reaction intermediates (carbocation - carboanion-free radicals)	8	√	√

## 5-Teaching and learning method

5<sub>1</sub>- Lectures

5<sub>2</sub>- tutorial sessions

5<sub>3</sub>- some part of lecture for discussion and problems solving

5<sub>4</sub>-writing a report

## 6- Teaching and Learning Methods of Disables

Non

## 7-Student Assessment

### a-Student Assessment Methods

1	Two Mid-term exams to assess the progress of the students along the mid semester
2	Oral discussion and participation in the class room to assess the students progress and personal attitude
3	Final exam to assess the ability of understanding ,remembering and assessing

### b-Assessment Schedule

No.	Assessment	Week
1	Participation in classes	All
2	Mid-term exam 1	7
3	Mid-term exam 2	11
4	Final exam	As the final exam schedule

### C- Weighting of Assessments

Assessment	Weight
Mid-term Examination 1	30 %
Mid-term Examination 2	20 %
Final Term Examination	40 %
Attendance and participation	10 %
Total	100 %

### 8- List of text book& References

a-Course note

b- Text books

1-Morrison and Boyd, organic chemistry 4<sup>th</sup> edition

### Course contents-ILOs Matrix

Content	Total hrs	Hours /lecture	K&U (a)	.S(b)	P.S(c)	G.S (d)
Types of hydrocarbons and their derivatives	4	2	a <sub>1</sub> ,a <sub>2</sub>	b <sub>1</sub>	c <sub>1</sub>	d <sub>1</sub> ,d <sub>2</sub> , d <sub>3</sub> ,d <sub>4</sub>
Molecular composition and structure of organic compounds: determination of empirical and molecular formula	4	2	a <sub>3</sub>	b <sub>2</sub>		d <sub>1</sub> ,d <sub>2</sub> , d <sub>3</sub> ,d <sub>4</sub>
Types of Hybridization and related geometry	^	ξ	a <sub>4</sub>	b <sub>5</sub>	c <sub>1</sub> , c <sub>2</sub>	d <sub>1</sub> ,d <sub>2</sub> , d <sub>3</sub> ,d <sub>4</sub>
Types of stereoisomers: enantiomers and diastereomers and their properties	^	ξ	a <sub>6</sub>	b <sub>1</sub> ,b <sub>2</sub> , b <sub>3</sub>	c <sub>3</sub>	d <sub>1</sub> ,d <sub>2</sub> , d <sub>3</sub> ,d <sub>4</sub>
Types of reactions: elimination –addition – substitution	^	ξ	a <sub>5</sub> ,	b <sub>6</sub>		d <sub>1</sub> ,d <sub>2</sub> , d <sub>3</sub> ,d <sub>4</sub> , d
Organic reaction mechanism: bond formation & fission, classification of reagents and reactions, reaction intermediates (carbocation - carboanion-free radicals)	^	ξ	a <sub>5</sub>	b <sub>6</sub>		d <sub>1</sub> ,d <sub>2</sub> , d <sub>3</sub> ,d <sub>4</sub> , d <sub>5</sub>

## Learning Method / ILO Matrix

Learning method	a <sub>1</sub>	a <sub>2</sub>	a <sub>3</sub>	a <sub>4</sub>	a <sub>5</sub>	a <sub>6</sub>	b <sub>1</sub>	b <sub>2</sub>	b <sub>3</sub>	b <sub>4</sub>	b <sub>5</sub>	b <sub>6</sub>	c <sub>1</sub>	c <sub>2</sub>	c <sub>3</sub>	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>
Lecture	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Tutorial session	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
discussion problem solving	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

**Head of Department:**

**Course Coordinators:** Dr. Hanaa Abulmagd & Dr. Mohamed Magdy

