



ASU
جامعة العلوم التطبيقية الخاصة
APPLIED SCIENCE PRIVATE UNIVERSITY

AMMAN - JORDAN



المستوى الذهبي

جامعة كل العرب

Faculty of Arts and Science
Course Syllabus
Semester: First
Academic Year 2019/ 2020

Course Title:	Organic chemistry 1
Course No.:	1722201
Prerequisite:	1722102
Department:	Chemistry
Coordinator:	Dr. Ahmed Abu-Rayyan

*** Instructor:**

Name	Office Number	Office Phone	Office Hours	E-mail
Dr. Ahmed Abu-Rayyan	220	1410	Su. Tu. Thu 10:00-11:00 Mon. Wed. 8:00-9:00	abu_rayyan@asu.edu.jo

• Course Description:

This course introduces basic ideas of organic chemistry covering: atomic structure and bonding in organic compounds, constitution and properties of the different classes of organic compounds (alkanes, cycloalkanes, alkenes, alkynes and alkyl halides) with considerable attention to nomenclature, stereochemistry, reaction mechanisms, and synthetic organic chemistry.

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رمز النموذج: UF 28 / 1

رقم القرار 24 / 233

تاريخ الاعتماد 2017/9/18



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• Intended Learning Outcomes:

Upon successful completion of this course, students will be able to:

A. Knowledge and Understanding:

- A1. Identify major principles and concepts in organic chemistry.
- A2. Name organic compounds either by common names or systematic (IUPAC) names. Nomenclature of organic compounds
- A3. Introduction to some synthetic methods in organic chemistry, involving functional group inter-conversions.

B. Cognitive and Intellectual Skills:

- B1. Identify different functional groups in organic chemistry, their classification and their physical properties.
- B2. Interpret and analyze chemical information and data obtained from reactions mechanisms.

C. Subject specific skills:

- C1. Correlating different structural features with their specific functions.
- C2. Understanding principles of stereochemistry & reaction mechanisms.
- C3. Relating the structure to physical and chemical properties of organic compounds.

D. Transferable Skills:

- D1. Communication skills, covering both written and oral communication.
- D2. Research ability in the field of organic chemistry.



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Program Learning Outcomes (PLOs):

1	Describe the fundamentals of chemistry including structure, reactivity and properties of chemical substances, different situation of reaction and the states of matter.
2	Construct essential facts, principles and theories across the four principal areas of chemistry, i.e. analytical, organic, inorganic and physical.
3	Align major issues currently at the frontiers of chemical research and development.
4	Memorize certain knowledge in Arabic and English languages, computer science, Islamic religion
5	Recognize certain subjects in biology, physics and mathematics that serve the chemistry disciplines
6	Outline the role of applied chemistry, which enables him to effectively use his/her information gained in all courses in different branches of chemistry
7	State certain subjects that are academically and/or professionally related to chemistry (for those completing the B.S.C. Chemistry degree that includes elective courses).
8	Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties
9	Explain concepts, principles and determine the efficiency of chemical systems by applying mathematical expressions
10	Analyze chemical and spectral data to identify and confirm chemical structures as well as determine chemical composition
11	Establish and conclude mechanisms for physical and chemical processes.
12	Solve the scientific problems using different mechanisms and procedures
13	Present scientific material and arguments clearly and correctly, in writing and

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	orally, to a range of audiences
14	Calculate mathematically the output of different chemical reactions
15	Demonstrate adequate life-long learning skills
16	Collaborate effectively with other people in a team.
17	Select appropriate techniques and procedures for chemical synthesis and analysis
18	Demonstrate information technology skills, especially in the areas of information retrieval, literature searching and use of library databases
19	Communicate effectively both orally and in writing with professionals and/or lay audience.
20	Interpret data derived from laboratory observations and measurements in terms of their significance and the theory underlying them.
21	Employ computational software's and data- processing skills in handling of chemical information and analysis of chemical data
22	Assemble and use properly chemistry experimental setups.
23	Perform correctly quantitative measurements requiring accurate and precise manipulations

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• **Course Contents and Schedule:**

Weeks	Subject	CLOs	PLOs
1	<u>Chapter 1: Structure and Bonding:</u> 1.1 Atomic Structure: Nucleus. 1.2 Atomic Structure: Orbitals. 1.3 Atomic Structure: Electron Configuration. 1.6 sp ³ Hybrid Orbitals. 1.7 sp ³ Hybrid Orbitals. 1.8 sp ² Hybrid Orbitals. 1.9 sp Hybrid Orbitals. 12 Drawing Chemical Structure	B1, A2, B2	1,2, 3 ,4 ,8 10,11,15,16,17,18,19,20
2	<u>Chapter 2: Polar Covalent Bonds:</u> 2.1 Polar Covalent Bonds: Electronegativity. 2.2 Polar Covalent Bonds: Dipole Moments. 2.3 Formal Charges. 2.4 Resonance. 2.7 Acids & Bases: The Bronsted-Lowry Definition. 2.8 Acids & Bases Strength. 2.10 Organic Acids & Organic Bases 2.11 Acids & Bases: The Lewis Definition.	C1, C3	1,2, 3 ,4 ,8 10,11,15,16,17,18,19,20
3& 4	<u>Chapter 3: Alkanes & Their Stereochemistry:</u> 3.1 Functional Groups 3.2 Alkanes & Alkane Isomers. 3.3 Alkyl Groups 3.4 Naming Alkanes. 3.5 Properties of Alkanes 3.6 Conformation of Alkanes. 3.7 Conformation of Other Alkanes.	C1, C2, C3,	1,2, 3 ,4 ,8 10,11,15,16,17,18,19,20
5	<u>Chapter 4: Cycloalkanes & Their Stereochemistry:</u> 4.1 Naming Cycloalkanes. 4.2 Cis-Trans Isomers in Cycloalkanes. 4.3 Stability of Cycloalkanes. 4.4 Conformation of Cycloalkanes. 4.5 Conformation of Cyclohexane. 4.6 Axial & equatorial Bonds in Cyclohexane.	A2,C1, C2, C3	1,2, 3 ,4 ,8 10,11,15,16,17,18,19,20



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	4.7 Conformation of Monosubstituted Cyclohexane's. 4.8 Conformation of Disubstituted Cyclohexanes.		
6 & 7	Chapter 5: Stereochemistry: 5.1 Enantiomers & tetrahedral Carbon. 5.3 Optical Activity. 5.5 Sequences Rules for Configuration. 5.6 Diastereomers. 5.7 Mezo Compounds. 5.8 Racemic Mixture. 5.9A Review of Isomers 5.11 Prochirality	A2, C1, C2, C3	1,2, 3, 4, 8 10,11,15,16,17,18,19,20
8	Chapter 6 : An Overview of Organic Reactions: 6.1 Kind of Organic Reactions 6.2 How Organic Reactions Occur 6.3 Radical Reactions 6.4 Polar Reactions 6.7-6. Describing a Reaction Mechanism.	A1, A2, B2, C1,	1,2, 3, 4, 8 10,11,15,16,17,18,19,20
9 & 10	Chapter 7: Alkenes: Structure and Reactivity. 7.1 Alkenes: Structure and Reactivity. 7.2 Degree of Unsaturation; 7.3 Naming Alkenes; 7.4 Cis-Trans Isomers of Alkenes. 7.5 Alkene Stereochemistry. 7.6 Stability of Alkenes. 7.7 Electrophilic Addition Reaction of Alkenes. 7.8 Markovnikov's Rule. 7.9 Carbocation Structure & Stability. 7.10 The Hammond Postulate	A1, A2, B2, B2,	1,2, 3, 4, 8 10,11,15,16,17,18,19,20
11	Chapter 8: Alkenes: Reactions and Synthesis: 8.1 Preparation of Alkenes; 8.2 Halogenation of Alkenes. 8.3 Halohydrin from Alkenes. 8.4-8.5 Hydration of Alkenes. 8.6 Reduction of Alkenes. 8.7-8.8 Oxidation of Alkenes. 8.9 Addition of Carbene to Alkenes. 8.10 Radical Addition to Alkenes.	A1, A2, B2, B2	1,2, 3, 4, 8 10,11,15,16,17,18,19,20



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12	<p>Chapter 9 Alkynes: 9.1 Naming of Alkynes. 9.2 Preparation of Alkynes. 9.3 Reaction of Alkynes. 9.4 Hydration of Alkynes. 9.5 Reduction of Alkynes. 9.6 Oxidative Cleavage of Alkynes. 9.7 Alkynes Acidity. 9.9 An Introduction to Organic Synthesis.</p>	A1,A2,B1 B2, C2, C3,	1,2, 3, 4, 8 10,11,15,16,17,18,19,20
13	<p>Chapter 10 Organohalides: 10.1 Names and Structure of Alkyl Halides. 10.2 Preparing Alkyl Halides from Alkanes. 10.3 Preparing Alkyl Halides from Alkenes. 10.4 Stability of Allyl Radicals. 10.5 Preparing Alkyl Halides from Alcohol. 10.6 Grignard Reagents.</p>	A1, A2, B2, C2, D1, D2	1,2, 3, 4, 8 10,11,15,16,17,18,19,20
14 & 15	<p>Chapter 11: Reactions of Alkyl Halides: Nucleophilic Substitutions and Elimination: 11.2 SN² Reaction. 11.3 Characteristics of SN² Reaction. 11.4 SN¹ Reaction. 11.5 Characteristics of SN¹ Reaction. 11.7 Elimination Reactions Rule 11.8-11.9 E2 Reactions: &11.10 E1 and E1cB Reactions</p>	C1, C3, , D1,D2	1,2, 3, 4, 8 10,11,15,16,17,18,19,20
16	Final		



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Teaching Methods

1. Inter active lectures
2. Group discussions
3. Assignments
4. Reports
5. Quizzes

* Evaluation:

Grading Plan and Assessments		
Methods	Weights	Due date
Mid-term <u>Via Microsoft Teams</u>	30%	16/12/2020
Written assignments & Quizzes <u>Via Microsoft Teams</u>	20%	TBA
Final Exam <u>Via Microsoft Teams</u>	50%	26/01/2021

- **Textbook:**

- Organic Chemistry, by John E. McMurry. 8thEd, 2012.

- **References:**

- Organic Chemistry, 7th Edition, L. G. Wade, Jr., Person Education Inc., 2010
- Organic Chemistry I For Dummies, by Arthur Winter. July (2008).
- Organic Chemistry I, by David R. Klein. 2nd edition June, (2007.)

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Subject Coordinator

Signature:

Head of Curriculum Committee

Signature:

Department Head

Signature:

Dean Faculty

Signature:

Copy to:

- Department Head.
- Head of Curriculum Committee.
- Course File.

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