COURSE DESCRIPTIONS

Faculty	Science				
Department	CHEMISTRY			**NQF level**	2
Course Title	Organic chemistry (2)	**Code**	122301	**Prerequisite**	
Credit Hours	3	**Theory**	3	**Practical**	3
Course Leader	**Mohammad Alidmat**	**email**	m.idmat@jadara.edu.jo		
Lecturers	**Mohammad Alidmat**	**emails**	m.idmat@jadara.edu.jo		
Lecture time		**Classroom**		**Attendance**	Fulltime
Semester	FIREST	**Production**	2025	**Updated**	2025\2026
Type of Teaching	✓ Face to Face				

Short Description

This course describes spectroscopic methods used to elucidate the structure of organic compounds. It discusses most of the functional groups in organic chemistry; nomenclature, structure, properties, reactions, mechanisms and synthesis.

Course Objectives

1. To instill in students a sense of enthusiasm for organic chemistry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.
2. To develop in students the ability to apply their chemical knowledge and skills to the solution of theoretical and practical problems in chemistry.
3. To provide students with a knowledge and skills base from which they can proceed to further studies in specialized areas of organic chemistry or multi-disciplinary areas involving organic chemistry.
4. To generate in students an appreciation of the importance of organic chemistry in an industrial, economic, environmental and social context.
5. Understand the mechanisms of organic reactions and use them to predict outcomes of reactions.
6. Explain the relative stability of aromatic compounds and demonstrate their reaction mechanisms.

7. Determine the structure of organic molecules using spectroscopic techniques.

Learning Outcomes
A. Knowledge - Theoretical Understanding
A1. Recall major principles and concepts in organic chemistry. **A2. Name organic compounds either by common names or systematic (IUPAC) names.** **A3. Mechanisms of some organic reactions**
B. Knowledge - Practical Application
A4. Introduction to some synthetic methods in organic chemistry, involving functional group interconversions.
C. Skills – Generic Problem Solving and Analytical Skills
B1. Use previous knowledge to identify products of chemical reactions important in organic chemistry Apply such knowledge and understanding to the solution of problems
D. Skills – Communication, ICT, and Numeracy
B2. Correlate structure to reactivity and stability in organic chemistry **B3. Evaluate and interpret chemical information and data..**
E. Competence: Autonomy, Responsibility, and Context
C1. Correlate reaction mechanism to reactants, reagents, and conditions used in a chemical reaction. C2. Relating the structure to physical and chemical properties of organic compounds.
Teaching and Learning Methods
✓ Face to Face Lectures ✓ Brain Storming ☐ Synchronous remote ✓ Asynchronous remote ✓ Using Video ✓ Discussions ☐ Research Project ☐ Problem solving
Assessment Methods
✓ Formative Assessment ✓ Quiz ✓ Homework ✓ Midterm ✓ Final Exam

Course Contents

Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1&2	6	A1, B3 C1, D1	Mass Spectrometry of Small Molecules: Magnetic-Sector Instruments. Interpreting Mass Spectra Mass Spectrometry of Some Common Functional Groups Mass Spectrometry in Biological Chemistry: Time-of-Flight (TOF) Instruments Spectroscopy and the Electromagnetic Spectrum. Infrared Spectroscopy Interpreting Infrared Spectra. Infrared Spectra of Some Common Functional Groups Discussion and problem solving.	Discussion Brainstorming Advanced Lecture (Presentations)	Short quizzes, Exams
3&4	6	A3, A4, C2, D1	Nuclear Magnetic Resonance Spectroscopy. The Nature of NMR Absorptions Chemical Shifts. 13C NMR Spectroscopy: Signal Averaging and FT–NMR Characteristics of 13C NMR Spectroscopy. DEPT 13C NMR Spectroscopy. Uses of 13C NMR Spectroscopy 1H NMR Spectroscopy and Proton Equivalence. Chemical Shifts in 1H NMR Spectroscopy. Integration of 1H NMR Absorptions: Proton Counting Spin–Spin Splitting in 1H NMR Spectra. More Complex Spin–Spin Splitting Patterns. Uses of 1H NMR Spectroscopy. Discussion and problem solving.	Discussion Brainstorming	Short quizzes, homework

5&6	3	A1, A4 B3	Stability of Conjugated Dienes: Molecular Orbital Theory Electrophilic Additions to Conjugated Dienes: Allylic Carbocations. Kinetic versus Thermodynamic Control of Reaction The Diels–Alder Cycloaddition Reaction. Characteristics of the Diels– Alder Reaction Structure Determination in Conjugated Systems: Ultraviolet Spectroscopy. Interpreting Ultraviolet Spectra: The Effect of Conjugation Sources and Names of Aromatic Compounds. Structure and Stability of Benzene Aromaticity and the Hückel 4n 1 2 Rule. Aromatic Ions. Aromatic Heterocycles: Pyridine and Pyrrole	Advanced Lecture (Presentations) Discussion Brainstorming	quizzes - homework – exams
7	3	A2, B3 C1, D1	Polycyclic Aromatic Compounds. Spectroscopy of Aromatic Compound Electrophilic Aromatic Substitution Reactions: Bromination Alkylation and Acylation of Aromatic Rings: The Friedel–Crafts Reaction Substituent Effects in Electrophilic Substitutions. Trisubstituted Benzenes: Additivity of Effects	Advanced Lecture (Presentations) Brainstorming	quizzes - homework – exams
8&9	6	A1, B2 C1, D3	Nucleophilic Aromatic Substitution Benzyne Oxidation of Aromatic Compounds Reduction of Aromatic Compounds Synthesis of Polysubstituted Benzenes Naming Alcohols and Phenols. Properties of Alcohols and Phenols. Preparation of Alcohols: A Review Alcohols from Carbonyl	Advanced Lecture (Presentations) Brainstorming	quizzes - homework – exams

			Compounds: Reduction Alcohols from Carbonyl Compounds: Grignard Reaction Reactions of Alcohols Oxidation of Alcohols Protection of Alcohols Phenols and Their Uses Reactions of Phenols Spectroscopy of Alcohols and Phenols		
10	3	A3, A4, C3,	Names and Properties of Ethers Preparing Ethers Reactions of Ethers: Acidic Cleavage Reactions of Ethers: Claisen Rearrangement Cyclic Ethers: Epoxides Reactions of Epoxides: Ring-Opening	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
11&12	3	A1, B2	Thiols and Sulfides Spectroscopy of Ethers Naming Aldehydes and Ketones. Preparing Aldehydes and Ketones Oxidation of Aldehydes and Ketones Nucleophilic Addition Reactions of Aldehydes and Ketones Nucleophilic Addition of H2O: Hydration Nucleophilic Addition of Alcohols: Acetal Formation Nucleophilic Addition of HCN: Cyanohydrin Formation Nucleophilic Addition of Hydride and Grignard Reagents: Alcohol Formation Nucleophilic Addition of Amines: Imine and Enamine Formation Nucleophilic Addition of Hydrazine: The Wolff–Kishner Reaction Conjugate Nucleophilic Addition to a,b-Unsaturated Aldehydes and Ketones Spectroscopy of Aldehydes and Ketones	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams

			Naming Carboxylic Acids and Nitriles Structure and Properties of Carboxylic Acids		
13	3	A1, B3 C1, D1	Substituent Effects on Acidity Preparing Carboxylic Acids Reactions of Carboxylic Acids: An Overview Chemistry of Nitriles Spectroscopy of Carboxylic Acids and Nitriles Naming Carboxylic Acid Derivatives Nucleophilic Acyl Substitution Reactions	Advanced Lecture (Presentations) Using instructional technologies	quizzes – homework – exams
14	3	A3, A4, C1, C2, D1	Reactions of Carboxylic Acids Chemistry of Acid Halides Chemistry of Acid Anhydrides Chemistry of Esters Chemistry of Amides	Advanced Lecture (Presentations) Using instructional technologies	quizzes – homework – exams
15	3	a2, a3, , b1	Spectroscopy of Carboxylic Acid Derivatives Discussion and problem Solving	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
16			Final exam		

Infrastructure	
Textbook	Organic Chemistry ,8th Edition, Paula Bruice , 2019 Organic Chemistry, by McMurry9th edition, 2019 .
References	• ***www.emedicine.com*** • ***www.sciencedirect.com*** • ***www.pubmed.com*** • Lecture handouts • Internet: there are many websites that provide valuable data related to organic chemistry including research paper, books, animation, etc. you can find more of these websites by searching in the internet using a suitable searching key. Many websites will be posted on E-learning during the semester.

Required reading	Textbook is obligatory and required by the students
Electronic materials	Provided to the students through JU e-learning website.
Other	In addition to the above, the students will be provided with handouts by the lecturer.

Course Assessment Plan									
Assessment Method		**Grade**	**CLOs**						
			A1& A2	**A3& A4**	**B1&B 2**	**B3**	**C1& C2**	**D1**	**D2 &D 3**
First(Midterm)		30%	6	8	1	0	7	8	0
Second (if applicable)									
Final Exam		50%	7	7	6	9	5	7	9
Coursework									
Coursework assessment methods	Assignments	10%	1	1	1	1	2	2	2
	Case study								
	Discussion and interaction								
	Group work activities								
	Labtests and assignments								
	Presentations								
	Quizzes	10%	2	2	1	1	1	2	1
Total		100%	16	18	9	11	15	19	12

Plagiarism
Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code). Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.