

COURSE DESCRIPTIONS

Faculty	Science				
Department	Chemistry	NQF level	3		
Course Title	Organic chemistry (3)	Code	122312	Prerequisite	
Credit Hours	3	Theory	3	Practical	--
Course Leader	Mohammad Alidmat	email	m.idmat@jadara.edu.jo		
Lecturers	Mohammad Alidmat	emails	m.idmat@jadara.edu.jo		
Lecture time	10-11.30	Classroom	F-202	Attendance	Fulltime
Semester	Secand_2025/2026	Production	2026	Updated	2026
Type of Teaching	✓Blended				
Short Description					
This course includes the study of β -dicarbonyl reactions and preparations, aliphatic and aromatic amines, the study of organic compounds of biological importance: carbohydrates, amino acids, peptides, proteins, lipids, heterocyclic compounds and nucleic acids, molecular orbitals and their controlled reactions.					
Course Objectives					
By the end of this course, students will be able to:					
<ol style="list-style-type: none"> 1. Understand the chemistry of β-dicarbonyl compounds <ul style="list-style-type: none"> ○ Explain their structure, reactivity, and methods of preparation. ○ Analyze key reactions such as keto–enol tautomerism and condensation reactions. 2. Describe the synthesis and properties of amines <ul style="list-style-type: none"> ○ Differentiate between aliphatic and aromatic amines. ○ Understand their physical properties, basicity, and common reactions. 3. Recognize and explain biologically important organic compounds <ul style="list-style-type: none"> ○ Identify the structure and function of carbohydrates, amino acids, peptides, proteins, and lipids. ○ Relate chemical structure to biological activity. 4. Understand the fundamentals of heterocyclic chemistry <ul style="list-style-type: none"> ○ Classify heterocyclic compounds and describe their synthesis and reactivity. ○ Recognize their importance in pharmaceuticals and biological systems. 5. Explain the structure and function of nucleic acids <ul style="list-style-type: none"> ○ Describe DNA and RNA components and their chemical bonding. ○ Understand their role in genetic information storage and transfer. 6. Apply molecular orbital theory to organic reactions <ul style="list-style-type: none"> ○ Interpret bonding and reactivity using molecular orbital concepts. ○ Predict outcomes of reactions based on orbital interactions. 7. Develop problem-solving skills in organic chemistry <ul style="list-style-type: none"> ○ Analyze reaction mechanisms and propose synthetic pathways. ○ Solve structure–reactivity relationship problems. 8. Relate organic chemistry to real-world and biological applications <ul style="list-style-type: none"> ○ Connect course concepts to medicinal chemistry, biochemistry, and industrial applications. 					

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Learning Outcomes	
A. Knowledge - Theoretical Understanding	
<p>A1. Describe the structure, properties, and reactivity of β-dicarbonyl compounds and their preparation methods.</p> <p>A2. Recall major principles and concepts related to aliphatic and aromatic amines.</p>	
B. Knowledge - Practical Application	
<p>A3. Explain the structure and classification of biologically important compounds including carbohydrates, amino acids, peptides, proteins, and lipids.</p> <p>A4. Explain molecular orbital theory and its application in predicting the reactivity and stability of organic compounds.</p>	
C. Skills – Generic Problem Solving and Analytical Skills	
B1. Analyze reaction mechanisms involving β -dicarbonyl compounds, amines, and related organic systems.	
D. Skills – Communication, ICT, and Numeracy	
B2. Solve problems related to synthesis and reactivity of organic and biologically important molecules.	
E. Competence: Autonomy, Responsibility, and Context	
<p>C1. Demonstrate independent learning in understanding advanced organic chemistry topics.</p> <p>C2. Apply organic chemistry knowledge in academic and real-world contexts such as medicinal and industrial applications.</p>	
Teaching and Learning Methods	
<p> <input checked="" type="checkbox"/> Face to Face Lectures <input type="checkbox"/> Brain Storming <input type="checkbox"/> Synchronous remote <input checked="" type="checkbox"/> Asynchronous remote <input checked="" type="checkbox"/> Using Video <input checked="" type="checkbox"/> Discussions <input type="checkbox"/> Research Project <input type="checkbox"/> Problem solving </p>	
Assessment Methods	
<input checked="" type="checkbox"/> Formative Assessment <input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Homework <input checked="" type="checkbox"/> Midterm <input checked="" type="checkbox"/> Final Exam	

Course Contents					
Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1.	3	a1, b1	Carbonyl Alpha- Substitution Reactions <ul style="list-style-type: none"> • Alpha Halogenation of Aldehydes and Ketones • Alpha Bromination of Carboxylic Acids • Acidity of Alpha Hydrogen Atoms: Enolate Ion Formation • Reactivity of Enolate Ions 	Discussion Brainstorming Advanced Lecture (Presentations)	Short quizzes, Exams

			Alkylation of Enolate Ions		
2.	3	a1, a2	Alkylation of Enolate Ions Alkylation of Enolate Ions Carbonyl Condensations: The Aldol Reaction	Discussion Brainstorming	Short quizzes, homework
3.	3	a3, b1, b2, C1	Carbonyl Condensations versus Alpha Substitutions Mixed Aldol Reactions Intramolecular Aldol Reactions	Advanced Lecture (Presentations) Discussion Brainstorming	quizzes - homework – exams
4.	3	a1, a2, b1,a3, a4, b2, C2	<ul style="list-style-type: none"> The Claisen Condensation Reaction Mixed Claisen Condensations Intramolecular Claisen Condensations: The Michael Reaction Carbonyl Condensations with Enamines The Robinson Annulation Reaction	Advanced Lecture (Presentations) Brainstorming	quizzes - homework – exams
5.	3	a1, a2, b2,a3, a4, b2, C1	<ul style="list-style-type: none"> 24.1 Naming of Amines. 24.2 Structure and Properties of Amines 24.3-24.4 Basicity of Amines 24.6 Synthesis of amines 24.7 Reactions of Amines 	Advanced Lecture (Presentations) Brainstorming	quizzes - homework – exams
6.	3	a2, b2 C1	<ul style="list-style-type: none"> 25.1 Classification of Carbohydrates 25.2 Depicting Carbohydrate Stereochemistry: Fischer Projections 25.3 D, L Sugars 25.4 Configurations of Aldoses 25.5 Cyclic Structures of Monosaccharides : Anomers 25.6 Reactions of Monosaccharides 	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
7.	3	a2, a3,a4, b1, b2 C2	<ul style="list-style-type: none"> 25.7 The Eight Essential Monosaccharides 25.8 Disaccharides 25.9 Polysaccharides and Their Synthesis 25.10 Other Important Carbohydrates 26.1 Structures of Amino Acids 26.2 Amino Acids and the Henderson– Hasselbalch Equation: Isoelectric Points 	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
8	3	a2, a3, a4, b1, b2	26.3 Synthesis of Amino Acids <ul style="list-style-type: none"> 26.4 Peptides and Proteins 26.5 Amino Acid Analysis of Peptides 26.6 Peptide Sequencing: The Edman Degradation 26.7 Peptide Synthesis 	Advanced Lecture (Presentations) Using instructional technologies	quizzes – homework – exams

9	3	a2, a3, a4, b1, b2	26.8 Automated Peptide Synthesis: The Merrifield Solid-Phase Method 26.9 Protein Structure 26.10 Enzymes and Coenzymes	Advanced Lecture (Presentations) Using instructional technologies	quizzes – homework – exams
10	3	a2, a3, b1	26.11 How Do Enzymes Work? Citrate Synthase 27.1 Waxes, Fats, and Oils 27.2 Soap 27.3 Phospholipids	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
11	3	a2, a3, b2	27.4 Prostaglandins and Other Eicosanoids 27.4 Prostaglandins and Other Eicosanoids 27.5 Terpenoids	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
12	3	a2, a3, b2	27.5 Terpenoids 27.6 Steroids 27.6 Steroids	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
13	3	a1, a2, a3,a4 b1,b2	27.7 Biosynthesis of Steroids 27.7 Biosynthesis of Steroids 27.7 Biosynthesis of Steroids	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
14	3	a1, a2, a3, a4, b1,b2	28.1 Nucleotides and Nucleic Acids 28.2 Base Pairing in DNA: The Watson–Crick Model 28.3 Replication of DNA	Advanced Lecture (Presentations) Using instructional technologies	quizzes - homework – exams
15	3	a1, a2, a3, a4, b1,b2	28.4 Transcription of DNA 28.5 Translation of RNA: Protein Biosynthesis 28.5 Translation of RNA: Protein Biosynthesis 28.7 DNA Synthesis 28.8 The Polymerase Chain Reaction		
16			Final exam		

Infrastructure	
Textbook	Organic Chemistry, by McMurry 10th edition, 2023
References	<ul style="list-style-type: none"> • www.emedicine.com • www.sciencedirect.com

	<ul style="list-style-type: none"> • 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	b2	c1	C1	
First(Midterm)	30%	6	8	1	0	7	8	0	0	
Second (if applicable)										
Final Exam	40%	5	3	5	5	4	7	7	4	
Coursework										
Coursework assessment methods	Assignments	15%	2	2	2	0	2	2	2	0
	Case study									
	Discussion and interaction									
	Group work activities									
	Labtests and assignments									
	Presentations									
	Quizzes	15%	3	3	3	0	3	3	3	0
Total	100%	16	16	11	5	16	20	12	4	

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.