

Course Syllabus

1	Course title	Bioorganic Chemistry	
2	Course number	0333433	
3	Credit hours	3 theory	
	Contact hours (theory, practical)	3 hours theory/week	
4	Prerequisites/corequisites	0303331	
5	Program title	B.Sc.	
6	Program code	NA	
7	Awarding institution	The University of Jordan	
8	School	Science	
9	Department	Chemistry	
10	Course level	4 rd Level	
11	Year of study and semester (s)	2023 -2024, 1 st Semester	
12	Other department (s) involved in teaching the course	B.Sc.	
13	Main teaching language	English	
14	Delivery method	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online	
15	Online platforms(s)	<input type="checkbox"/> Moodle <input type="checkbox"/> Microsoft <input checked="" type="checkbox"/> Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....	
16	Issuing/Revision Date	20/06/2023	

17 Course Coordinator:

Name: Prof. Dr. Jalal Zahra

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Contact hours: 10:30 11:30 Su, Tu, Th

18 Other instructors:

19 Course Description:

The course covers Topics of current interest in bioorganic chemistry. Catalysis in Organic Reactions. The Organic Chemistry of Coenzymes, Compounds Derived from Vitamins. The Organic Chemistry of Metabolic Pathways. The Organic Chemistry of Drugs: Discovery and Design. Enzyme models.

20 Course aims and learnings outcomes (CLOs):

A- Course Learning Outcomes: 0333433 Bioorganic Chemistry

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

CLO-1: Provide students with the knowledge and skills to understand the structures of organic compounds and their properties and reactivity.

CLO-2: Apply catalysis in organic reactions.

CLO-3: Outline the organic chemistry of coenzymes and compounds derived from vitamins.

CLO-4: Understand the organic chemistry of metabolic pathways.

CLO-5: Understand the organic chemistry involved in the discovery and design of drugs.

CLO-6: Apply enzyme models in organic chemistry.

B- Students Learning Outcomes (SLOs):

- SO-1. Problem Solving: Graduates will be able to apply mathematical and scientific knowledge to identify, formulate, and solve technical or scientific problems relevant to the discipline of chemistry.
- SO-2. Design: Graduates will be able to use their understanding of chemistry concepts and principles to formulate and design systems, processes, procedures, or programs to meet desired goals and outcomes.
- SO-3. Experimental Skills: Graduates will be able to design, conduct, and analyze experiments or test hypotheses, utilizing appropriate chemical techniques and scientific judgment to draw meaningful conclusions.
- SO-4. Communication: Graduates will be able to communicate scientific information effectively and accurately to a range of audiences, including both technical and non-technical audiences.
- SO-5. Ethics and Global Context: Graduates will understand and apply ethical and professional responsibilities in the context of the impact of technical and scientific solutions on global, economic, environmental, and societal issues.
- SO-6. Teamwork: Graduates will be able to work effectively as part of a team, establishing goals, planning tasks, meeting deadlines, and analyzing risk and uncertainty in the context of chemistry-related projects and initiatives.
- SO-7. Handling Chemicals: An ability to apply the proper procedures for safe handling of chemicals.

0333336 Identification of Organic Compounds

		Student Outcomes (SO)						
		SO-1	SO-2	SO-3	SO-4	SO-5	SO-6	SO-7
Course Learning Outcomes (CLO)	CLO-1	✓	✓					
	CLO-2	✓	✓					
	CLO-3	✓	✓					

21. Topic Outline and Schedule:

	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Evaluation Methods	Resources
1	1.1	Catalysis in Organic Reactions	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	1.2	Acid Catalysis, Base Catalysis	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	1.3	Nucleophilic Catalysis	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
2	2.1	Metal-Ion Catalysis	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	2.2	Intramolecular Reactions,	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	2.3	Intramolecular Catalysis	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
3	3.1	Catalysis in Biological Reactions	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	3.2	Enzyme-Catalyzed Reactions	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	3.3	The Organic Mechanisms of the Coenzymes	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
4	4.1	The Vitamin Needed for Many Redox Reactions:	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	4.2	Vitamin B3	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	4.3	Flavin Adenine Dinucleotide and Flavin Mononucleotide: Vitamin B	SO-1 & SO-2	Face to Face	Classroom	First exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
5	5.1	Thiamine Pyrophosphate: Vitamin B1	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition

	5.2	Biotin: Vitamin H	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	5.3	Pyridoxal Phosphate: Vitamin B6	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
6	6.1	Coenzyme B12: Vitamin B12	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	6.2	Tetrahydrofolate: Folic Acid	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	6.3	Vitamin KH ₂ : Vitamin K	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
7	7.1	ATP is Used for Phosphoryl Transfer Reactions	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	7.2	The Three Mechanisms for Phosphoryl Transfer Reactions	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	7.3	The Three Mechanisms for Phosphoryl Transfer Reactions	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
8	8.1	The "High-Energy" Character of Phosphoanhydride Bonds	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	8.2	Why ATP is Kinetically Stable in a Cell	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
	8.3	The Four Stages of Catabolism	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, Paula Bruice, 6 th Edition
9	9.1	The Four Stages of Catabolism	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, McMurry, 8 th Edition
	9.2	The Catabolism of Fats	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, McMurry, 8 th Edition
	9.3	The Catabolism of Carbohydrates	SO-1 & SO-2	Face to Face	Classroom	Mid exam, Final exam	Organic Chemistry, McMurry, 8 th Edition
10	10.1	The Fates of Pyruvate	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
	10.2	The Catabolism of Proteins	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
	10.3	The Citric Acid Cycle Oxidative Phosphorylation Anabolism	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
11	11.1	Naming Drugs Lead Compounds	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
	11.2	Molecular Modification Random Screening	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition

	11.3	Serendipity in Drug Development	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
12	12.1	Receptors Drugs as Enzyme Inhibitors	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
	12.2	Designing a Suicide Substrate	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
	12.3	Quantitative Structure-Activity Relationships (QSAR)	SO-1 & SO-2	Face to Face	Classroom	Final exam	Organic Chemistry, McMurry, 8 th Edition
13	13.1	Molecular Modeling Combinatorial Organic Synthesis	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra
	13.2	Antiviral Drugs Economics of Drugs Governmental Regulations	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra
	13.3	Molecular recognition	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra
14	14.1	Supramolecular chemistry (Host-guest chemistry)	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra
	14.2	Molecular asymmetry and prochirality	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra
	14.3	Biomimetic chemistry and artificial enzymes	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra
15	15.1	Crown ethers, Cyclodextrins	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra
	15.2	Calixartenes	SO-1 & SO-2	Face to Face	Classroom	Final exam	Bio-organic Chemistry, Harish K. Chopra

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
First exam	20%	Weeks 1-3	SO-1 & SO-2	5 weeks	In the department
Mid exam	30%	Weeks 4-6	SO-1 & SO-2	10 weeks	In the department



Final exam	50%	All	SO-1 & SO-2	16 weeks	In the department
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23 Course Requirements

White or smart board

24 Course Policies:

A- Attendance policies: A- Attendance policies:

Maximum 15% absence is allowed.

B- Absences from exams and submitting assignments on time:

Incomplete Exams are conducted later after arrangement a new date.

C- Health and safety procedures:

This is a theoretical course.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

The general Jordan University's laws are applied in any case of cheating.

E- Grading policy:

Letters scale is applied.

F- Available university services that support achievement in the course:

Free Internet-access and E-learning.

25 References:

1. Organic Chemistry, Paula Bruice, 6th Edition
2. Organic Chemistry, McMurry, 8th Edition
3. Bio-organic Chemistry, Harish K. Chopra



4. Fundamentals of Medicinal Chemistry, Gareth Thomas

26 Additional information:

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Name of Course Coordinator: -----	Signature: -----	Date: -----

Head of Curriculum Committee/Department: -----	Signature: -----	

Head of Department: -----	Signature: -----	
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Head of Curriculum Committee/Faculty: -----	Signature: -----	
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Dean: -----	Signature: -----	