



Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
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	Number of Pages	06

1.	Course Title	Chemistry of Heterocyclic Compounds
2.	Course Number	0303734
3.	Credit Hours (Theory, Practical)	3,0
	Contact Hours (Theory, Practical)	3,0
4.	Prerequisites/ Corequisites	N.A
5.	Program Title	Masters in Chemistry
6.	Program Code	
7.	School/ Center	Science
8.	Department	Chemistry
9.	Course Level	Master Level
10.	Year of Study and Semester (s)	First/second year and First/second
11.	Other Department(s) Involved in Teaching the Course	N.A
12.	Main Learning Language	English
13.	Learning Types	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online
14.	Online Platforms(s)	<input type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams
15.	Issuing Date	1-11-2024
16.	Revision Date	

17. Course Coordinator:

Name: Prof. Kamal Sweidan	Contact hours: any time via e-mail
Office number: 204	Phone number: +96265353000-Ext. 22155,
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**18. Other Instructors:**

Name: N.A

Office number:

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Contact hours:

19. Course Description:

An extensive study of the chemistry of three-, four-, five-, six- membered rings containing one heteroatom or more including their reaction mechanisms and examples of their biological applications, general topics in heterocyclic chemistry which include: methods of synthesis, aromaticity, chemical reactivity, stability and others.

20. Program Student Outcomes (SO's): (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

- SO1. Demonstrate comprehensive knowledge and understanding of chemistry topics, achieving expertise in foundational research principles.
- SO2. Maintain ethical standards in research.
- SO3. Improve communication of scientific knowledge through structured reports, presentations, and discussions.
- SO4. Engage in activities that enhance practical scientific skills and improve professional expertise.
- SO5. Develop independent research skills to solve complex problems, focusing on analytical and critical thinking.

21. Course Intended Learning Outcomes (CLO's): (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. Identify various nomenclature systems of heterocyclic compounds and their physical properties.
2. Understand the main synthetic methods of heterocyclic compounds
3. Understand the various reaction mechanisms of heterocyclic compounds
4. Apply organic reactions in multi-steps synthesis of various heterocyclic compounds.
5. Summarize and present scientific papers concerning heterocyclic compounds.



Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
1	√	√				
2		√	√			
3		√	√	√		
4						√
5					√	

22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Program SO's	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)
Course CLO's					
CLO (1)	√				
CLO (2)					
CLO (3)	√				
CLO (4)				√	
CLO (5)		√	√		

23. Topic Outline and Schedule:



Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types Face to Face (FF) Blended (BL)	Platform Used	Synchronous (S) Asynchronous (A)	Evaluation Methods	Learning Resources
1	1.1	Introduction and importance of heterocyclic compounds	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	1.2	Nomenclature of heterocyclic compounds (replacement)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	1.3	Nomenclature of heterocyclic compounds (Hantzsch-Widman)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
2	2.1	Nomenclature of heterocyclic compounds (Hantzsch-Widman) More examples	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	2.2	Nomenclature of heterocyclic compounds (Common)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	2.3	Nomenclature of heterocyclic compounds (Common)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
3	3.1	Nomenclature of fused heterocyclic compounds (Common)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	3.2	Complex names of drugs (students)	1+5	FF	Microsoft Teams	A	Quiz, Midterm and	See Ref.



							Final Exams	
	3.3	QUIZ		FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
4	4.1	Effect of heteroatom on structure and properties (resonance, aromaticity, nonaromaticity, antiaromaticity)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	4.2	Effect of heteroatom on structure and properties (dipole moment and charge density, x-ray analysis)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	4.3	Effect of heteroatom on structure and properties (UV, NMR, mesoionic compounds)	1	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
5	5.1	Different types of nucleophilic, electrophilic centers, and leaving groups in organic chemistry	2	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	5.2	General synthetic methods in organic chemistry	2	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	5.3	Baldwin's rule (Examples and discussion)	2	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
6	6.1	General synthetic methods in organic chemistry (different types of cyclization reactions)	2	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	6.2	General synthetic methods in organic chemistry (different types of cyclization reactions)	2	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.



	6.3	General synthetic methods in organic chemistry (different types of cycloaddition reactions)	2	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
7	7.1	General synthetic methods in organic chemistry (radical reactions, carbenes and nitrenes)	2	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	7.2	More specific examples will be given by students then discussion will be performed.	5	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	7.3	Saturated three-membered heterocycles containing one heteroatom (oxiranes-synthesis and reactions)	3	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
8	8.1	Saturated three-membered heterocycles containing one heteroatom (aziridines-synthesis and reactions)	3	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	8.2	Saturated three-membered heterocycles containing one heteroatom (thiiranes-synthesis and reactions)-More applications will be provided by students	3	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
	8.3	Saturated four-membered heterocycles containing one heteroatom. (synthesis and reactions)	3	FF	Microsoft Teams	A	Quiz, Midterm and Final Exams	See Ref.
9	9.1	Aromatic five-membered heterocycles containing one heteroatom. (synthesis and reactions) pyrrole, furan, thiophene	3	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	9.2	Mid-exam		FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	9.3	Aromatic five-membered heterocycles containing more than one heteroatom. (synthesis	3	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.



		and reactions) imidazole, pyrazole, thiazole, oxazole,...						
10	10.1	Aromatic five-membered heterocycles containing more than one heteroatom. (synthesis and reactions) imidazole, pyrazole, thiazole, oxazole, ... More applications will be provided by students	3+5	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	10.2	Non-aromatic five membered rings (synthesis and reactions)	3	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	10.3	Quiz		FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
11	11.1	Aromatic six-membered heterocycles containing one heteroatom. (synthesis and reactions) pyridine, piperidine	3	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	11.2	Aromatic six-membered heterocycles containing more than one heteroatom. (synthesis and reactions) pyrimidine, pyrazine, pyridazine.	3	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	11.3	Aromatic six-membered heterocycles containing more than one heteroatom. (synthesis and reactions) pyrimidine, pyrazine, pyridazine. More applications will be provided by students	3+5	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
12	12.1	Non-aromatic six membered rings (synthesis and reactions)	3	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	12.2	Quiz		FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	12.3	Comparison of basicity and acidity in 5 and 6-membered heterocyclic compounds	1	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
13	13.1	Comparison of nucleophilic aromatic substitution in 5 and	2	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.



		6-membered heterocyclic compounds						
	13.2	Comparison of electrophilic aromatic substitution in 5 and 6-membered heterocyclic compounds	2	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	13.3	Recent scientific papers concern on heterocycles (presented and discussed by students)	5	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
14	14.1	Recent scientific papers concern on heterocycles (presented and discussed by students)	5	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	14.2	Fused carbocycles and heterocycles-structures and orbitals overlapping	1+4	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	14.3	Fused heterocyclic compounds (indole, quinolone, isoquinoline, benzofuran, benzothiophene)	4	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
15	15.1	Fused heterocyclic compounds (indole, quinolone, isoquinoline, benzofuran, benzothiophene)	4	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	15.2	Fused heterocyclic compounds (indole, quinolone, isoquinoline, benzofuran, benzothiophene)	4	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
	15.3	Applications of fused heterocycles (by students)	4+5	FF	Microsoft Teams	A	Quizzes and Final Exam	See Ref.
16							Final Exam	



24. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Quiz 1	10	1.1-3.2	1	3	In Class
Quiz 2	10	9.3-10.2	2-3	10	In Class
Quiz 3	10	11.1-12.1	4	12	In Class
Midterm	30	1.1-9.1	1-3	9	In Class
Final Exam	40	1.1-15.3	1-5	16	In Class

25. Course Requirements:

Students should have a computer and internet connection

26. Course Policies:

A- Attendance policies: Maximum 20% 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,

27. References:

A- Required book(s), assigned reading and audio-visuals:

Introductory Heterocyclic Chemistry: Peter A. Jacobi, 2019.



Fundamental of Heterocyclic Chemistry, Quin James and Tyrell, 2010.

B- Recommended books, materials, and media:

Heterocyclic Chemistry: Gilchrist, 3rd Ed., 1997.

Heterocyclic Chemistry: Joule and Mills, 5th Ed., 2010.

28. Additional information:

N.A

Name of the Instructor or the Course Coordinator: Prof. Kamal Sweidan	Signature:	Date:
The Head of Graduate Studies Committee/ Department Chemistry Dr. Murad AIDamen, Prof.	Signature:	Date:
The Head of Department of Chemistry Dr. Murad AIDamen, Prof.	Signature:	Date:
Vice Dean for Graduate Studies and Scientific Research / School of Science Dr. Kamal Sweidan, Prof.	Signature:	Date:
The Dean of School of Science Dr. Mahmoud I. Jaghoub, Prof.	Signature:	Date: