



Course Specifications

Course Title:	Heterocyclic chemistry
Course Code:	4023556-3
Program:	Chemistry-Industrial chemistry
Department:	Chemistry
College:	Applied Science
Institution:	Umm Al-qura University

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A. Course Identification

1. Credit hours: 3 h
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 5 th level/3 th year
4. Pre-requisites for this course (if any): Chemistry of aromatic compounds (4022142-3)
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	73%
2	Blended		
3	E-learning	√	27%
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	22
2	Laboratory/Studio	30
3	Tutorial	--
4	Others (E-learning + Exams + office hours)	15
	Total	67

B. Course Objectives and Learning Outcomes

1. Course Description

This course includes teaching the different methods of classification and nomenclature of heterocyclic ring systems and explaining the chemical properties of the heterocyclic compounds and mechanisms with some focus on methods of syntheses and related reactions for selected heterocyclic ring systems.

2. Course Main Objective

By the end of this course student will be familiar with different methods of nomenclature, chemical properties, syntheses and reactions of different heterocyclic compounds.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	Recognizing the molecular structures of different heterocyclic compounds	K1
1.2	Demonstrate the classifications of heterocyclic compounds according to their different types	K2

CLOs		Aligned PLOs
1.3	Knowledge of different methods for nomenclature of heterocyclic compounds containing oxygen, sulfur and nitrogen and how to draw the chemical structures properly.	K2
1.4	Showing the multiple methods of preparation of heterocyclic compounds	K4
1.5	Recognizing the chemical properties of heterocyclic compounds	K2
1.6	Gaining a fruitful new and simple methodologies for chemical reactions of different heterocyclic compounds	K3
1.7	Recognizing the important characteristics and new culture(s) and at least one other culture and their impacts on course development	K4
2	Skills :	
2.1	The student's acquiring of the skill of how to predict the outcomes of interactions of heterocyclic compounds	S1
2.2	Making the student acquire the skill of naming heterocyclic compounds	S1
2.3	Design of different ways to nomenclature the heterocyclic compounds	S1
2.4	The student can pick the appropriate methods for the preparation of heterocyclic compounds	S2
2.5	Development of reverse thinking skill (back thinking) and the student's acquiring the training skill to choose the suitable method for preparation of heterocyclic compounds	S3
2.6	Student invents different ideas for the construction of many of the heterocyclic compounds	S4
2.7	Planning to make area of research in the field of chemistry of heterocyclic compounds and their applications	S5
3	Values:	
3.1	Demonstrating the skills in the usage of computer, network, and software programs related to chemistry, e.g. chem-draw, Microsoft excel, power point and word	V2
3.2	The ability to work independently to handle chemicals and data	V3
3.3	The ability to communicate results of work to classmate and participation in class or laboratory discussions	V1
3.4	Demonstrate the ability to work effectively in a team with generating a new competition spirit	V1
3.5	Demonstrating the effective oral communication skills	V1

C. Course Content

No	List of Topics	Contact Hours
.1	Definition and classification of heterocyclic compounds	2+2E
.2	Nomenclature of heterocyclic compounds	4+2E
.3	Bonding, structure, properties, and aromaticity of heterocyclic compounds	4
.4	Structure and reactivity of five and six-membered heterocyclic compounds	2
.5	Chemical reactions of five and six-membered rings and their benzo	4

	fused systems	
.6	Cycloaddition reactions of heterocyclic compounds	2
.7	Synthetic Routes to five membered rings and their benzo fused systems	2
.8	Synthetic Routes to six membered rings and their benzo fused systems	2+ 2E
Total		28

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Recognizing the molecular structures of different heterocyclic compounds	Lectures	Mid-term and final Exams
1.2	Demonstrate the classification of heterocyclic compounds according to their different types	Lectures Lab work E-Learning	Mid-term and final Exams Practical Lab exam Assignments and activities on blackboard
1.3	Knowledge of different methods for nomenclature of heterocyclic compounds containing oxygen, sulfur and nitrogen and how to draw the chemical structures	Lectures	Mid-term and final Exams
1.4	Showing the multiple methods of preparation of heterocyclic compounds	Lectures	Mid-term and final Exams
1.5	Recognizing the chemical properties of heterocyclic compounds	Lectures Lab work E-Learning	Mid-term and final Exams Practical Lab exam Assignments and activities on blackboard
1.6	Gaining a fruitful new and simple methodologies for chemical reactions of different heterocyclic compounds	Lectures	Mid-term and final Exams
1.7	Recognizing the important characteristics and new culture(s) and at least one other culture and their impacts on course development	Lectures	Mid-term and final Exams
2.0	Skills		
2.1	Predict the mechanism of reactions and synthesis of heterocyclic compounds	E-Learning	Assignments and activities on blackboard
2.2	Apply the aromaticity rule for different heterocyclic compounds	Lecture	Mid-term and final Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	choose the suitable method for preparation of heterocyclic compounds	Lecture	Mid-term and final Exams
2.4	Predict the expected product and mechanism of different reactions of heterocyclic compounds	Lecture	Mid-term and final Exams
2.5	Adapt and practice chemical processes for the construction of some of the heterocyclic compounds	Self-Directed private Study	Assignments and activities
2.6	Perform a small research in the field of chemistry of heterocyclic compounds and their applications and usage of computer, network, and software programs related to chemistry, e.g. chem-draw, microsoft excel, power point and word and the ability to communicate results of work to classmate and participation in class or laboratory discussions	Cooperative learning and Presentations Group	Report and research on Project production
3.0	Values		
3.1	Demonstrate the ability to work effectively in a team with generating a new competition spirit	Lab work	Practical Lab report and Exam

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	E-learning	All weeks	5%
2	Assignments and activities	All weeks	5%
3	Mid-term Exam	6	20%
4	Practical Lab Work (Reports and Exams)	11	30%
5	Final Exam.(2 hours exam)	12	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- A faculty member was assigned to provide counseling and advice (about 20-25 student/ one faculty member).
- Office hours of the instructor: during the working hours weekly.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	The Chemistry of Heterocycles (Nomenclature and Chemistry of Three-to-Five Membered Heterocycles) ISBN 978-0-08-101033-4
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	DOI https://doi.org/10.1016/C2015-0-05990-
Essential References Materials	Electronic lecture handouts are available for the students either on blackboard or via their e-mail
Electronic Materials	Lecture Hand-out available as a PowerPoint presentation. http://www.chemweb.com <ul style="list-style-type: none"> • http://www.sciencedirect.com • http://www.rsc.or
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with capacity of (30) students. A laboratory with capacity of (15) students Including all practical facilities
Technology Resources (AV, data show, Smart Board, software, etc.)	Teaching halls and laboratories are equipped with data show projector and electronic board screen.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Some Specialized software's for chemistry e.g. Institutional License for Chem Office , ACD labs, etc.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	<u>Indirect</u> (Online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching	Faculty members	<u>Direct</u> (classroom observation using the Teaching Observation Concepts and Teaching Observation Proforma
Achievement of course learning outcomes.	Faculty members	<u>Direct</u> (60% of the students achieved $\geq 70\%$ of the degree assigned to the course learning outcome).
Assessment of faculty members	Department head	<u>Direct</u> (Performance Assessment of faculty <u>Indirect</u> (feedback from faculty and students).
Quality of learning resources	Students	<u>Direct</u> (feedback from faculty). <u>Indirect</u> (online survey at the end of the semester (Program survey, Experience survey & course evaluation) and graduates survey.
Effectiveness of teaching Strategies for Learning Outcomes.	Faculty members	<u>Direct</u> (Comments of course instructors regarding evaluation of teaching strategies for learning outcomes mentioned in course report).

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

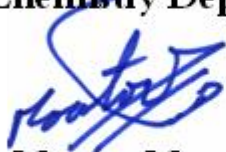
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Quality committee and department Council
Reference No.	
Date	2022

Head of Chemistry Department



Dr Moataz Morad

