هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Heterocyclic Organic Chemistry
Course Code:	CHEM336-2
Program:	Bachelor of Science in Chemistry
Department:	Department of Physical Sciences
College:	College of Science
Institution:	Jazan University
Version:	TP-153 (2024)
Last Revision Date:	31 January 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2hrs)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐ Elective		

3. Level/year at which this course is offered: 5th Level/ 3rd Year.)

4. Course general Description:

Course title	Course code	Contact Hours			Credit Hours	Year	Level	Prerequisite	Corequisite
		Lec	Tut	Lab					
Heterocyclic Organic Chemistry	CHEM 336-2	2	0	0	2	3rd	5th	CHEM 234-3	---

This course aims to give the student basic knowledge of heterocyclic organic compounds, their physical and chemical properties and their most important chemical reactions. The importance of heterocyclic chemistry in the pharmaceutical industry

5. Pre-requirements for this course (if any)**:**

CHEM234-3

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

1. **Identify the structural structure of Five-membered and Six-membered heterocyclic compounds.**
2. **Understand the classification and nomenclature of heterocyclic compounds.**
3. **Understand the synthetic methods for the preparation of Five-membered and Six-membered heterocyclic compounds.**
4. **Understand the strategic considerations and reaction mechanisms involved in the synthesis of heterocyclic compounds.**
5. **Study the reactivity of heterocyclic compounds.**
6. **The importance of heterocyclic chemistry in the pharmaceutical industry**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	$(2.\times 15) = 30$	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding;** *Upon completion of the course, students are able to:*			
1.1	**Demonstrate a broad, knowledge and understanding of heterocyclic topic as Nomenclature of heterocyclic compounds, Five- Membered rings with one hetero atom , Fused benzene ring Five-Membered rings with one hetero atom , Five-Membered rings with two hetero atom, Six-Membered rings with one hetero atom , Fused benzene ring Six-Membered rings with one hetero atom , important of the Biological activities of heterocyclic compounds (I)**	**K1**	**lecture / discussion Seminars /presentation**	**Objective question**
1.2	**Describe the aromatic character of some heterocyclic compounds and explain some of**	**K2**	**lecture / discussion**	**Objective question**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	their synthetic methods. (I)		Seminars /Presentation	
2.0	**Skills;** *Upon completion of the course, students are able to:*			
2.1	Demonstrate the knowledge and skills to interpret products obtained from different reaction conditions 4regarding heterocyclic chemistry (I)	S1	lecture / discussion Seminars /presentation	Objective question
2.2	writes an essay on the topic of heterocyclic chemistry (I)	S2	presentation	Assignment & class activity
3.0	**Values, autonomy, and responsibility; Upon completion of the course, students are able to:**			
3.1	Recognize a chemist's ethical and scientific responsibilities.	V2	Research activities	Plagiarism detection

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction of heterocyclic compounds Nomenclature of heterocyclic compounds Nomenclature of one ring heterocyclic compounds with one heteroatoms (N,O,S)	2
2.	Nomenclature of heterocyclic compounds: Nomenclature of one ring heterocyclic compounds with two or more heteroatoms (N,O,S). 9Nomenclature of fused ring heterocyclic compounds with one or more heteroatoms (N,O,S).	3
3.	Five-Membered rings with one hetero atom Pyrrole (Azole), Furan and Thiophene (Methods of preparation, Physical properties and structure, Chemical properties) Reactions : (basicity ; acidity properties) . Fuse ring Five-Membered rings with one hetero atom	6
4.	Indole – benzofuran- benzothiophene (Methods of preparation, Physical properties and structure, Chemical properties. Five-Membered rings with two hetero atoms	4
5.	Pyrazole and Imidazole (Methods of preparation, Physical properties and structure , Chemical properties) Six-Membered rings with one hetero atom Pyridine (Methods of preparation. Physical and chemical properties)	3

6.	Derivative of pyridine (alkyl pyridine, amino pyridine) Six-Membered rings with two hetero atom Pyradiazine pyrimidine, pyrazine (Methods of preparation. Physical and Chemical properties	4
7.	Fused Six-Membered rings with one hetero atom Quinoline and isoquinoline (Methods of preparation. Physical and Chemical properties.	4
8.	Six membered rings with one oxygen atom (Pyran-Coumarin-4-Chromone) Six-membered rings with two different heteroatoms (Morpholine-piperazine-phenoxazine)	2
9.	The importance of heterocyclic chemistry in the pharmaceutical industry	2
Total		$2 \times 15w = 30$

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	*Periodic Exams*	*During Semester*	*30%*
2.	*Assignments & Classroom Activities*	*During Semester*	*20%*
6.	*Final Exam*	*16-17*	*50%*
	Total		*100%*

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Introduction to Heterocyclic Chemistry Peter A. Jacobi ISBN: 978-1-119-41768-2 August 2018 272 Pages
Supportive References	1. Heterocyclic chemistry; Gilchrist, T. L. 3rd ed.; Addison Wesley Longman: Edinburgh Gate, 1997. 2. Heterocyclic chemistry; Joule, J. A.; Mills, K.; 4th ed.; Blackwell Science: Oxford, 2000. 3. Heterocyclic Chemistry, R. R. Gupta, M. Kumar, V. Gupta, Volume II: Five-Membered Heterocycles, Springer, ISBN 978-3-642-08460-7, 1999.
Electronic Materials	https://b-ok.asia/book/829427/cae9f4 https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A Organic_Chemistry_(McMurry)/15%3A_Benzene_and_Aromaticity/

	15.06%3A_Aromatic_Heterocycles-_Pyridine_and_Pyrrole
Other Learning Materials	**Computer-based programs/ ChemDraw**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	*Lecture room(s) for groups of 30 students*
Technology equipment (projector, smart board, software)	*Smart board, Data show, Black board, internet*
Other equipment (depending on the nature of the specialty)	*None*

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect
Effectiveness of Students' assessment	Instructor & Course coordinator	Class room evaluation (direct & indirect
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physical Sciences Department Council
REFERENCE NO.	Meeting (3)
DATE	12/03/2024 -02/09/1445