



Course Specifications

Course Title:	Heterocyclic Chemistry
Course Code:	417CHEM-2
Program:	Bachelor of science in Chemistry
Department:	Chemistry
College:	Science
Institution:	King Khalid University

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A. Course Identification

1. Credit hours: 2
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: Level 7 / 4 th year
4. Pre-requisites for this course (if any): 313CHEM
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	100%
2	Blended		0%
3	E-learning	-	0%
4	Correspondence	-	0%
5	Other	-	0%

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	0
4	Others office hours and interaction by electronic or virtual media	0
	Total	30
Other Learning Hours*		
1	Study	10
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	0
5	Others (specify)	0
	Total	30

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course is designed to covers the basic principles of some classes of heterocyclic organic compounds, involving nomenclature, synthesis, reactions and their applications.

2. Course Main Objective

The main purpose of this course is to demonstrate to students the principles of nomenclature of heterocyclic organic compounds and different methods used for their preparation. The course also aims to teach students how to write the mechanisms of the chemical reactions used to prepare heterocyclic organic compounds or that occur during electrophilic and nucleophilic reactions for these compounds.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	To teach students the basic principle of Heterocyclic compounds.	K1
1.2	To recognize the correct nomenclature for different classes of heterocyclic compounds and its fused rings.	K1&K3
1.3	To define the reactivity of heterocyclic compounds towards electrophilic and nucleophilic substitution reactions.	K1
1.4	To list the different famous organic reactions (named reactions) and their application in organic synthesis.	K3
1.5	To write the reactions mechanisms.	K1
2	Skills:	
2.1	To summarize the chemistry of heterocyclic compounds and their properties and applications.	S1
2.2	To demonstrate the different famous organic reactions.	S3
2.3	To design the reactions mechanism.	S1&S3
3	Competence:	
3.1	To illustrate the ethics of dealing with their colleagues and with the lecturer.	C2
3.2	To demonstrate the ability to work under time and environmental pressures	C1
3.3	To have full responsibility for working and creating new practices and ways of thinking to enhance the quality of life.	C5

C. Course Content

No	List of Topics	Contact Hours
1	<ul style="list-style-type: none">Introduction, Identification and importance of Heterocyclic compounds.Nomenclature of heterocyclic compounds and fused heterocyclic compounds.	6
2	Chemistry of Five membered rings containing one hetero-atom (Pyrrole, Furan, Thiophene) and their benzofused (indole)- Elucidation the structure of Heterocycles, Aromaticity, preparation, and chemical reactions)- Pharmaceutical applications.	6
3	Chemistry of five-membered rings containing two hetero-atoms (Pyrazole, Isoxazole, Isothiazole, Imidazole, Oxazole, and Thiazole) and their benzofused (Benzimidazole and benzthiazole –Elucidation the Structure of Heterocycles- Aromaticity- preparation, and chemical reactions- Pharmaceutical applications.	6
4	Chemistry of six-membered rings containing hetero-atoms (Pyridine, Pyridine-N-Oxide, Pyran, 2-Pyrone, 4-Pyrone) and their benzofused (Quinoline, Isoquinoline, Coumarin, Benzopyrone)- Elucidation the Structure of Heterocycles, preparation, and chemical reactions- Pharmaceutical applications.	7
5	Chemistry of six-membered rings containing Two hetero-atoms (Pyridazine, Pyrimidine, Pyrazine) and their benzofused (Cinnoline, phthalazine, Quinazoline and Quinoxaline)-	5

Elucidation the structure, preparation, and chemical reactions- Pharmaceutical applications.	
Total	30

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		
1.1	To teach students the basic principle of Heterocyclic compounds.	<ul style="list-style-type: none"> • Lectures • Classroom discussion • Case study 	<ul style="list-style-type: none"> • Homework • Assignments • Examinations
1.2	To recognize the correct nomenclature for different classes of heterocyclic compounds and its fused rings.		
1.3	To define the reactivity of heterocyclic compounds towards electrophilic and nucleophilic substitution reactions.		
1.4	To list the different famous organic reactions (named reactions) and their application in organic synthesis.		
1.5	To write the reactions mechanisms.		
2.0	Skills		
2.1	To summarize the chemistry of heterocyclic compounds and their properties and applications.	<ul style="list-style-type: none"> • Lectures • Classroom discussion • Case study 	<ul style="list-style-type: none"> • Written exams • Oral discussion
2.2	To demonstrate the different famous organic reactions.		
2.3	To design the reactions mechanism.		
3.0	Competence		
3.1	To illustrate the ethics of dealing with their colleagues and with the lecturer.	<ul style="list-style-type: none"> • Lectures • Classroom discussion • Case study 	<ul style="list-style-type: none"> • Class activities • Oral presentation for students reports • Oral discussion
3.2	To demonstrate the ability to work under time and environmental pressures		
3.3	To have full responsibility for working and creating new practices and ways of thinking to enhance the quality of life.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	1 st semi-semester	6 th	15%
2	2 nd semi-semester	12 th	15%
3	Homework assignments	3 rd , 5 th and 7 th	10%
4	Reports and Oral Discussion	8 th , 9 th and 11 th	10%
5	Final Written exam	15 th	50%

*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:

10 office hours are offered for students for individual consultations. Communications are available on-site, phone conversations, and chatting by social media.

F. Learning Resources and Facilities**1. Learning Resources**

Required Textbooks	Heterocyclic Chemistry, by J. A. Joule & K. Mills, Wiley & Sons., New York, 5th ed., 2010.
Essential References Materials	The Chemistry of Heterocycles" T. Eicher and S. Hauptmann (2008)
Electronic Materials	https://www.heterocycles.jp/newlibrary/libraries/prepress
Other Learning Materials	<ul style="list-style-type: none"> • ChemDraw Program, • Journal of Heterocyclic Chemistry. • European Journal of Medicinal Chemistry. • Heterocycles

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom and computer lab
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> • Data Show. • Smart board. • Chem draw program. • ISIS draw program. • Internet access. • Accessible databases
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	-

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course delivery (teaching methods and assessment methods)	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
	Program Leader	Meetings
Course contents (update).	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
Quality of learning resources	External reviewers	Reports

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	Department counsel
Reference No.	1/22/142
Date	15-9-1442