



Course Specifications

Course Title:	Heterocyclic Chemistry
Course Code:	2043202-3
Program:	Bachelor in Chemistry
Department:	Department of Chemistry
College:	College of Sciences
Institution:	Taif University

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A. Course Identification

1. Credit hours: 3 (2 Theoretical, 1 Lab)
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: 6 th Level/ 2 nd Year
4. Pre-requisites for this course (if any): Organic Chemistry 2 (2042203-3)
5. Co-requisites for this course (if any): NA

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3 Theoretical and 2 Practical hours/ Week	100 %
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	20
3	Tutorial	-
4	Others (specify)	-
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

The course provides an introduction to the broad field of heterocyclic organic chemistry by reviewing the major classes of heterocyclic compounds in terms of nomenclature, structure, properties, preparations and reactions. The syntheses of several physiologically important heterocyclic compounds are given.

2. Course Main Objective

The course aims to provide students with different concepts and fundamentals of the chemistry of heterocyclic compounds and their importance.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Memorize the methods of preparation and reactions of some heterocyclic compounds	K2
1.2	Explain the rule of heterocycles in industry	K3
2	Skills:	
2.1	Demonstrate a logical process based on well-established scientific	S1

CLOs		Aligned PLOs
	principles	
2.2	Evaluate the impact of heterocyclic compounds in environmental applications	S3
3	Values:	
3.1	Evaluate the skill of team work	V1
3.2	Represent the academic ethics and responsibility	V2

C. Course Content

No	List of Topics	Contact Hours
1	Brief Introduction of heterocycles and their importance.	3
2	Nomenclature of heterocyclic compounds.	3
3	Different methods for the preparation and reactions of three membered: Oxirane, Aziridine and Thietane.	3
4	Different methods for the preparation of four membered: Oxirane, Aziridine and Thietane.	3
5	Different methods for the preparation of five membered: Furan, Thiophene and Pyrrole.	3
6	Different methods for the preparation of f Benzofuran, Benzothiophene and Benzopyrrole (Indole).	3
7	Pyridine and its derivatives: Resonance and aromaticity; Synthesis and reactions.	3
8	Preparation of Pyridine salts and Pyridine <i>N</i> -oxides and their applications	3
9	Study of reactivity on side chain derivatives. Reactants to open the pyridine ring.	3
10	Biological importance of heterocycles.	3
Total		30

Lab Content

No	List of Topics	Contact Hours
1	Introduction to Heterocyclic Organic Chemistry Lab: Safety, Instrumentations, Solvents purification (Distillation, filtration, extraction and crystallization). Melting point and boiling point determination. Chromatographic separation methods.	2
2	Preparation of 2,5-dimethylpyrrole	4
3	Fisher indole: Synthesis of 2-phenylindole	2
4	Preparation of- 7-hydroxy-4-methyl coumarin	4
5	Preparation of Nicotinic acid	4
6	Synthesis of theophylline	4
Total		20

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	Memorize the methods of preparation and reactions of some heterocyclic compounds	Lecture	Written exam
1.2	Explain the rule of heterocycles in industry	Lecture	Written exam
2.0	Skills		
2.1	Demonstrate a logical process based on well-established scientific principles	Discussion	Homework Assignments
2.2	Evaluate the impact of heterocyclic compounds in environmental applications	Problem-Solving	Practical tasks and Exam
3.0	Values		
3.1	Evaluate the skill of team work	Collaborative Learning	Individual presentations
3.2	Represent the academic ethics and responsibility	Collaborative Learning	Individual presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework Assignments	Throughout Semester	5%
2	Individual presentations	Throughout Semester	5%
3	Mid Term Exam	6	20%
4	Practical tasks	Throughout Semester	25%
5	Final practical Exam	10/11	5%
6	Final exam	11/12	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:

Commitment to the rules of the Academic Advising Department at the university in accordance with the academic guidance manual approved by the university and the attached forms, there are different arrangements made by teaching staff to support student consultations including;

- Office hours: 8 hours per a week for each academic member.
- Academic guidance: an academic member has a number of students to guide them throughout degree journey.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> The Chemistry of Heterocycles: Structure, Reactions, Syntheses, and Applications. Eicher, T.; Hauptmann, S. (2003). Wiley-VCH Verlag GmbH & Co., Latest Edition ISBN: 9783527307203. https://tinyurl.com/bddx6yuf
Essential References Materials	<ul style="list-style-type: none"> Heterocyclic Chemistry. T. L. Gilchrist (1993). Addison-Wesley Longman Ltd. (USA), Latest Edition. ISBN: 978-0582064201. https://tinyurl.com/mjz82xsn
Electronic Materials	<ul style="list-style-type: none"> Saudi Digital Library (SDL) https://apps.tu.edu.sa/sdl/default.aspx
Other Learning Materials	<ul style="list-style-type: none"> Learning Management System (Blackboard) Software programs for graphing organic compounds and chemical reactions (Chem draw , Chem sketch)

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> Lecture hall with 100 seats. Equipped Lab with essential instrumentations.
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> Computer and data show with Wi-Fi access. ChemDraw and Chem sketch software.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<ul style="list-style-type: none"> Melting point instrument. IR spectroscopy instrument.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment	Students	Survey (indirect method)
Extent of achievement of course learning outcomes	Program leader	Reports (Direct method)
Quality of learning resources	Peer referees Students	Reports (Direct method) Survey (indirect method)

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 Council/ Quality assurance committee
Reference No.	2-5-1444
Date	01/11/2022