2023
TP-153

Course Specification
(Bachelor)

Course Title:	Organometallic Chemistry
Course Code:	CHEM421-2
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:	30/01/2024

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: (7th Level--- 8th Year.)

4. Course general Description:

Course title	Course code	Contact Hours			Credit Hours	Year	Level	Prerequisite	Corequisite
		Lec	Tut	Lab					
Organometallic Chemistry	CHEM421-2	2	0	0	2	4th	7th	CHEM326-3	--

This course aims to introduce the students to know the deferent structures of the organometallic compounds, preparations, nomenclature, structures, type of bonding, and their applications in homogenous and heterogeneous catalysis.

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

CHEM326-3

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

None

7. Course Main Objective(s):

1. **Recognizing the general properties of organometallic compounds.**
2. **Describing the general properties of organometallic compounds.**
3. **Designing the synthesis reactions of organometallic compounds.**
4. **Applying the effective atomic number and the eighteen rules of organometallic compounds.**
5. **Comparing between different types of reactions, homogeneous and heterogeneous catalysis, and their applications.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• 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 in the preparation, reagents, properties of organometallic compounds. (M)***	**K(1.1)**	***Lecture group work discussion***	***Objective Q***
1.2	***Describe the essential facts, principles and theories in organometallic compounds and its application in chemistry. (M)***	**K(2)**	**Lecture group work discussion**	**Short answer Questions**
2.0	**Skills;** *Upon completion of the course, students are able to:*			
2.1	***Demonstrate the knowledge and skills in the aspects of organometallic compounds, to analyze the obtained from the synthesis reactions. (M)***	**S(1)**	**lecture / discussion / Seminars /Individual presentation**	**Essay Q**
2.2	***Make effective use of communication, and online technology about chemistry topics in order to improve their basic knowledge in writing***	**S(5)**	**project-based learning Technology-enabled learning**	**Research presentation rubric**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	(report and paper/ poster) with a good verbal and clear scientific language. (M)			
3.0	Values, autonomy, and responsibility; *Upon completion of the course, students are able to:*			
3.1	*Act with integrity and good ethics in chemistry profession and their obligation to society (M)*	V(2)	Research activities	Ethic Rubric check

C. Course Content

No	List of Topics	Contact Hours
1.	*Introduction: definition and classification of organometallic compounds, and a brief history of the nature of organometallic compounds,*	3
2.	*Concept of chemical bonding, brief summary of transition metals, stability of the d-electrons compared to main group elements with examples, classification of ligands*	6
3.	*Concept of 18- electrons, atomic number rules, explain the stability of organometallic compounds with examples and limitations of 18- electrons rule*	3
4.	*Organometallic compounds containing carbonyl group using molecular orbital theory, synthesizing metal carbonyl compounds with their reactions*	3
5.	*Using infrared spectra to identify metal carbon bonds, study of the hydride/ carbonyl complexes, methods of preparation and the reaction of their compounds, discovery of dihydrogen complexes and their mechanisms*	3
6.	*Study of metal alkali complexes, methods of preparation, utilizing them as stabilized carbanion, Study of metal alkene complexes- study of metallocene's complexes- σ (sigma) and π (pi) complexes*	6
7.	*Structure features and properties- comparison between the activities of organometallic compounds of various elements*	3
8.	*The naturally occurring organometallic compounds- synthesis and biological activity*	3
	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%*

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
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	*Organometallics: A Concise Introduction, Christoph Elschenbroich and Albrecht Salzer, 2nd ed.,1992, Wiley- VCH.*
Supportive References	*1- Modern Inorganic Chemistry, Sajed Mahmoud Lateef, 1st edition, 2022.* *2- Synthesis Methods of Organometallic and inorganic Chemistry, W. A. Hermann, Vol. 3 G. Thieme, 1996.* *3- Applied Organometallic for Main Groups Elements, Abdelaziz Ibrahem Alwasel, 2nd edition, 2013.*
Electronic Materials	Some course contents and materials are posted on Black board sites
Other Learning Materials	https://chem.libretexts.org/Special:Search?qid=&fpid=230&fpth=&query=organometallic+chemis&type=wiki

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	*1 Lecture room(s) for groups of 50 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