هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Organometallic Chemistry**
Course Code:	**2043201-2**
Program:	**Bachelor in Chemistry**
Department:	**Department of Chemistry**
College:	**College of Sciences**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours: 2 (Theoretical)
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 6th Level/ 2nd 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**	2 Theoretical 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**	-
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	**30**

B. Course Objectives and Learning Outcomes

1. Course Description

The course describes the history and key advances for Organometallic Chemistry, physical methods in organometallic chemistry, applications in organic synthesis and basic organometallic complexes in catalysis. It provides a wide knowledge about the naturally occurring organometallic compounds; their synthesis and biological efficiency.

2. Course Main Objective

The recognition of the basic knowledge of organometallic chemistry and focus on modern applications and practical topics of these compounds.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Recognize the general properties of organometallic compounds	K1
1.2	Describe the metal alkene complexes and their applications	K2
2	**Skills:**	

CLOs		Aligned PLOs
2.1	Apply the eighteen electron rule to the organometallic compounds	S1
2.2	Design synthesis reactions of organometallic compounds	S2
3	**Values:**	
3.1	Illustrate the concept of teamwork	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction: definition and classification of organometallic compounds- A brief history of the nature of organometallic compounds	2
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	4
3	Concept of 18 electrons rule- Explain the stability of organometallic compounds with examples- Limitations of 18 electrons rule	4
4	Organometallic compounds containing carbonyl group- Using molecular orbital theory to explain metal-carbonyl bonds- Synthesizing of metal-carbonyl compounds with their reactions- Using IR spectra to identify metal carbon bonds	4
5	Study of the hydride/carbonyl complexes, method of preparation and the reaction of their compounds- Discovery of dihydrogen complexes and their mechanism- Study of the metal alkyl complexes, method of preparation and utilizing them as stabilized carbanion	4
6	Study of the metal alkene complexes with their use in olefins reactions-Study of diene, allyl and polyene complexes- Study metallocenes complexes, structure features and properties	4
7	Comparison between the activities of organometallic compounds of various elements	4
8	The naturally occurring organometallic compounds; Synthesis and biological activity	4
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 and Understanding**		
1.1	Recognize the general properties of organometallic compounds	Lecture	Written Exam
1.2	Describe the metal alkene complexes and their applications	Lecture	Written Exam
2.0	**Skills**		
2.1	Apply the eighteen electron rule to the organometallic compounds.	Discussion	Homework Assignments
2.2	Design synthesis reactions of	Problem-Solving	Report Assignments

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	organometallic compounds		
3.0	**Values**		
3.1	Illustrate the concept of teamwork	Collaborative Learning	Individual presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework Assignments (Electronic)	Throughout Semester	15%
2	Individual presentations	Throughout Semester	5%
3	Periodical Exam	7/8	15%
4	Mid Term Exam	11/12	15%
5	Final exam	16	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:

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	• Organometallics, Christoph Elschenbroich (2006), VCH-Wiley (USA), Latest Edition. ISBN: 978-3-527-29390-2.
Essential References Materials	• The Organometallic Chemistry of the Transition Metals, Robert H. Crabtree (2005). John Wiley & Sons, Inc. (USA), Latest Edition. ISBN: 9780471662563.
Electronic Materials	• Saudi Digital Library (SDL)
Other Learning Materials	• Learning Management System (Blackboard) • Computer programs for graphing organic compounds and chemical reactions (Chem draw , Chem sketch)

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture hall with 100 seats.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Computer and data show with Wi-Fi access. • ChemDraw and Chem sketch software.

Item	Resources
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
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.	7-3-1445
Date	27/2/1445 HJ 12/09/2023 G