




# Course Specifications

<b>Course Title:</b>	Organometallic Chemistry
<b>Course Code:</b>	4024575-2
<b>Program:</b>	Chemistry
<b>Department:</b>	department of chemistry
<b>College:</b>	Faculty of Applied Science
<b>Institution:</b>	Umm Al-qura University



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## A. Course Identification

<b>1. Credit hours: 2 (theoretical)</b>
<b>2. Course type</b>
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"/>
<b>3. Level/year at which this course is offered:</b> 7 <sup>th</sup> level/4 <sup>th</sup> year
<b>4. Pre-requisites for this course (if any):</b> Coordination Chemistry
<b>5. Co-requisites for this course (if any):</b> --

## 6. Mode of Instruction (mark all that apply)

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

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	--
3	Tutorial	--
4	Others (specify)	--
	<b>Total</b>	30
<b>Other Learning Hours*</b>		
1	Study	30
2	Assignments	10
3	Library	3
4	Projects/Research Essays/Theses	3
5	Others (quizzes and exams preparation)	20
	<b>Total</b>	66

\* 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

The current course introduce the chemistry of organometallic compounds including their structures, nomenclature, classifications, reactions in addition to their applications in the field of catalysis

## 2. Course Main Objective

By the end of studying of this course the student should fully understand:

- The basic concepts of chemistry of organometallic compounds including their classifications and nomenclature.
- The chemical and physical properties of organometallic compounds as well as their economic importance.

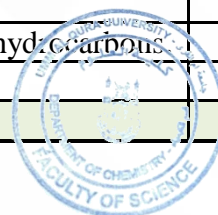
## 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge:</b>	
1.1	Recognize the rules of nomenclature of $\sigma$ -bonded and $\pi$ -bonded complexes.	K1
1.2	Identify the eighteen electron rule and oxidation numbers.	K1
1.3	List the methods of synthesis of organometallic compounds.	
1.4	Describe structure and bonding in organometallic compounds.	K1
1.5	Memorize the application of organometallic compounds in organic preparations and reactions.	K4
1.6	Recall some catalytic application of organometallic compounds.	K4
<b>2</b>	<b>Skills :</b>	
2.1	Explain the nomenclature of $\sigma$ -bonded and $\pi$ -bonded organometallic compounds.	S1
2.2	Apply the eighteen electron rule to the organometallic compounds.	S2
2.3	Summarize the preparation methods of the organometallic compounds.	S4
2.4	Explain the structure and bonding in organometallic compounds.	S1
2.5	Interpret examples of organometallic compounds and their applications in organic synthesis and reactions.	S4, S8
<b>3</b>	<b>Competence:</b>	
3.1	Use information and communication technology.	C3
3.2	Apply IT and communication technology in gathering and interpreting information and ideas concerning the course topics.	C3
3.3	Develop the student's ability in self-dependence and self-study.	C2
3.4	Encourage students to use on-line libraries for searching and interpreting up to dated aspects relating to the application of organometallic compounds	C3

## C. Course Content

No	List of Topics	Contact Hours
1	History and nomenclature of $\sigma$ -bonded and $\pi$ -bonded complexes.	2
2	Eighteen electron rule – oxidation number.	2
3	Preparation of organometallic compounds: direct reactions between $\pi$ -complexes and alkyl halides.	2
4	Preparations involving organometallic compounds: reaction with organic halides, reaction with free metals and their compounds.	2

5	Substitution reactions: substitution of hydrogen with metal.	2
6	Addition reactions: addition of metallic compounds to multiple bonds and electrochemical methods.	2
7	Structure and bonding in organometallic compounds.	6
8	Application of organometallic compounds in organic reactions and organic synthesis.	6
9	Organometallic complexes of transition metals – unsaturated hydrocarbons.	2
10	Catalytic applications of organometallic compounds.	4
<b>Total</b>		<b>30</b>



## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Recognize the nomenclature of $\sigma$ -bonded and $\pi$ -bonded complexes.	lecture	quiz
1.2	Identify the eighteen electron rule and oxidation numbers.	discussion	quiz
1.3	List the methods of synthesis of organometallic compounds.	lecture	quiz
1.4	Describe structure and bonding in organometallic compounds.	lecture	exam
1.5	Memorize the application of organometallic compounds in organic reactions and organic synthesis.	Lecture and web based study	exam and report
1.6	Recall some catalytic application of organometallic compounds.	Lecture and web based study	exam and report
<b>2.0</b>	<b>Skills</b>		
2.1	Explain the nomenclature of $\sigma$ -bonded and $\pi$ -bonded organometallic compounds.	lecture	quiz
2.2	Apply the eighteen electron rule to the organometallic compounds.	lecture and discussion	quiz
2.3	Summarize the preparation methods of the organometallic compounds.	lecture	quiz
2.4	Explain the structure and bonding in organometallic compounds.	Lecture and web based study	exam and report
2.5	Interpret examples of using organometallic compounds in organic synthesis	lecture and discussion	exam
<b>3.0</b>	<b>Competence</b>		
3.1	Encourage the ability to communicate results of work to classmates. Ability to work in a team to perform a specific task.	Scientific discussion and web-based study	web-based student performance systems.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.2	Apply IT and communication technology in gathering and interpreting information and ideas concerning the course topics.	web-based study	web-based student performance systems
3.3	Develop the student's ability in self-dependence and self-study.	Scientific discussion	individual and group presentations
3.4	Encourage students to use on-line libraries for searching and interpreting up to dated aspects relating to the application of organometallic compounds	Library visits and web-based study	web-based student performance systems

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	--	10 %
2	First Periodic Exam.	6	20 %
3	Second Periodic Exam.	12	20 %
4	Final Exam.(2 hours 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 :**

- Office hours: During the working hours weekly,
- Academic advising for students.
- Availability of Staff members to provide counseling and advice.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	- James E. Huheey, "Inorganic Chemistry: Principles of Structure and Reactivity", 4th Edition, 2006, Pearson Education India. - B.D. Gupta, Anil J. Elias " <i>Basic Organometallic Chemistry: Concepts, Syntheses and Applications</i> " 2013, Universities Press.
<b>Essential References Materials</b>	- R.H. Crabtree " <i>The Organometallic Chemistry of the Transition Metals</i> " 6 <sup>th</sup> ed. 2014, Wiley publisher. - Leah Renold, <i>Applied Organometallic Chemistry and Catalysis</i> , 2005, Oxford University Press.

<b>Electronic Materials</b>	- <a href="http://www.chemweb.com">http://www.chemweb.com</a> - <a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a> - <a href="http://www.rsc.org">http://www.rsc.org</a>
<b>Other Learning Materials</b>	- None.

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Well provided Classrooms with capacity of (30) students
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Rooms equipped with computers and data show
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment	students	Questionnaire evaluation of the course.
Evaluation of the extent of achievement of course learning outcome	Program/Department Instructor	Annual course report
Verification of Standards of Student Achievement	Peer review	- Check marking of a sample of exam papers, or student work. -Exchange corrected sample of assignments or exam basis with another staff member for the same course in other faculty.

**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

<b>Council / Committee</b>	
<b>Reference No.</b>	
<b>Date</b>	

Received by: **Dr. Ismail Althagafi**

**Department Head**

Signature:



Date: 20/12/2019



