



Course Specifications

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

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A. Course Identification

1. Credit hours:
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: 7 th level/4 th year
4. Pre-requisites for this course (if any): Coordination Chemistry
5. Co-requisites for this course (if any): nothing

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	75%
2	Blended	--	--
3	E-learning	√	25%
4	Distance learning	--	--
5	Other	--	--

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	22
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (E-learning + Exams + office hours)	10
	Total	32

B. Course Objectives and Learning Outcomes

1. Course Description

The current course introduces 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
1	Knowledge and Understanding	
1.1	Explain the mechanism of reactions involving the synthesis and applications of organometallic compounds.	K1
1.2	Recognize the rules of nomenclature of σ -bonded and π -bonded complexes.	K2
1.3	List the methods used for preparation of organometallic compounds	K2
1.4	Identify the eighteen-electron rule and oxidation numbers.	K1
1.5	List the methods of synthesis of organometallic compounds.	K2
1.6	Give examples of catalytic applications of organometallic compounds with some up to dated examples	K3
2	Skills :	
2.1	Apply the IUPAC rules for the nomenclature of σ -bonded and π -bonded organometallic compounds.	S2
2.2	Determine the stability of organometallic compounds applying the eighteen-electron rule to the.	S1
2.3	Employ the organometallic compounds for catalytic reactions.	S2
2.4	Use IT and communication technology in gathering and interpreting information and ideas concerning organometallic compounds and their importance.	S5
3	Values:	
3.1	Write and present, collaboratively and constructively, reports related to course topics.	V3

C. Course Content

No	List of Topics	Contact Hours
1	History and nomenclature of σ -bonded and π -bonded complexes.	2
2	Chemistry of Eighteen electron rule – oxidation number.	2
3	Preparation of organometallic compounds: direct reactions between metals and alkyl halides.	2
4	Preparations involving organometallic compounds: reaction with organic halides, reaction with free metals and their compounds.	4
5	Substitution reactions: substitution of hydrogen with metal.	2
6	Midterm exam	1
6	Addition reactions: addition of metallic compounds to multiple bonds and electrochemical methods.	2
7	Structure and bonding in organometallic compounds.	4
8	Application of organometallic compounds in organic reactions and organic synthesis.	4
9	Catalytic applications of organometallic compounds.	3E
10	Organometallic complexes of transition metals – unsaturated hydrocarbons.	3E
	Final exam	2
Total		31

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	Explain the mechanism of reactions involving the synthesis and application of organometallic compounds.	Lecture	Midterm and final Exams Active participation of students within their group on blackboard
1.2	Recognize the rules of nomenclature of σ -bonded and π -bonded complexes.	lecture	Quizzes Midterm and final Exams
1.3	List the methods used for preparation of organometallic compounds	lecture discussion	Quizzes Midterm and final Exams
1.4	Identify the eighteen-electron rule and oxidation numbers.	lecture	Quizzes

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			Midterm and final Exams
1.5	List the methods of synthesis of organometallic compounds.	Self-Directed private Study	Assignments and activities
1.6	Give examples of catalytic applications of organometallic compounds with some up to dated examples	E- learning	Assignments on blackboard
1.7	Knowing the Organometallic complexes of transition metals – unsaturated hydrocarbons.	E- learning	Assignments on blackboard
2.0	Skills		
2.1	Apply the IUPAC rules for the nomenclature of σ -bonded and π -bonded organometallic compounds.	lecture discussion	Midterm exam and final exam
2.2	Explain the stability of organometallic compounds applying the eighteen-electron rule to the.	Self – direct private study	Midterm exam and final exam
2.3	Employ the organometallic compounds for catalytic reactions.	lecture	Midterm exam and final exam
2.4	Use IT and communication technology in gathering and interpreting information and ideas concerning organometallic compounds and their importance.	Cooperative learning and group presentations	Report and research on project production Assignment on blackboard
3.0	Values		
3.1	Write and present, collaboratively and constructively, reports related to course topics.	Library visitis	Assignments and activities

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and activities	All weeks	10 %
2	E-learning	All weeks	10 %
3	Mid-term Exam	6	30 %
4	Final Exam (2 hours exam)	12	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

Required Textbooks	- James E. Huheey, "Inorganic Chemistry: Principles of Structure and Reactivity", 4th Edition, 2006, Pearson Education India. - B.D. Gupta, Anil J. Elias "Basic Organometallic Chemistry: Concepts, Syntheses and Applications" 2013, Universities Press.
Essential References Materials	- R.H. Crabtree "The Organometallic Chemistry of the Transition Metals" 6 th ed. 2014, Wiley publisher. - Leah Renold, <i>Applied Organometallic Chemistry and Catalysis</i> , 2005, Oxford University Press.
Electronic Materials	- http://www.chemweb.com - http://www.sciencedirect.com - http://www.rsc.org
Other Learning Materials	- None.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Well provided Classrooms with capacity of (30) students
Technology Resources (AV, data show, Smart Board, software, etc.)	Rooms equipped with computers and data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Non

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.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
		-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

Council / Committee	Quality committee and department Council
Reference No.	1 st meeting
Date	2021

Head of Chemistry Department

Dr Moataz Morad

