

**Kingdom of Saudi Arabia**

**The National Commission for**

**Academic Accreditation & Assessment**



**Course Specifications**

**Organometallic Chemistry**

**(402426-2)**

### Course Specifications

Institution: <b>Umm Al-qura University</b>	Date of Report: <b>2016</b>
College/Department : <b>Faculty of Applied Science/ Chemistry Department</b>	

#### A. Course Identification and General Information

1. Course title and code: <b>Organometallic Chemistry/ 402426-2</b>			
2. Credit hours: <b>2</b>			
3. Program(s) in which the course is offered. <b>Chemistry program</b>			
4. Name of faculty member responsible for the course: <b>Dr. Hoda El-Ghamry</b>			
5. Level/year at which this course is offered: <b>7<sup>th</sup> level/4<sup>th</sup> year</b>			
6. Pre-requisites for this course (if any): <b>Coordination Chemistry (402325-3)</b>			
7. Co-requisites for this course (if any):			
8. Location if not on main campus: <b>All campus (El-Abedyah, El-Zaher and Elaziziah)</b>			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
b. Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	<b>100%</b>
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
f. Other	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
Comments:			

## B Objectives

1. What is the main purpose for this course?

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

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

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

**The students will be mentioned to prepare an essay or a report from literature using the library, data base services, and/or websites to follow up and update the new topics of the subject of the course**

**C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)**

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact Hours
a. Nomenclature of $\sigma$ -bonded and $\pi$ -bonded complexes.	1	2
b. Eighteen electron rule – oxidation number	1	2
c. Preparation of $\sigma$ -bonded complexes: preparation of metal carbonyls and carbonyl anions	1	2
d. Direct reactions between metals and alkyl halides	1	2
e. Preparations involve organometallic compounds: reaction with organic halides, reaction with free metals and their compounds.	1	2
f. Substitution reactions: substitution of hydrogen with metal	1	2
g. Addition reactions: addition of metallic compounds to multiple bonds.	1	2
h. Preparations involve dizonium salts.	1	2
i. Extrwion reaction – preparation of carbenes.	1	2
j. Preparation and reactions of $\pi$ -bonded organometallic compounds – complexes of alkynes and alkenes	1	2

k. Structure and bonding in organometallic compounds.	1	2
l. Application of organometallic compounds in organic preparations: organolithium compounds, organomagnesium compounds, organocopper compounds, organoaluminium compounds, organosilicon compounds, organoiron compounds	2	4
m. Organometallic complexes of transition metals – unsaturated hydrocarbons	1	2

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## II-General scheme for identification of organic aliphatic unknown

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	28	-	-	-		28
Credit	2	-	-	-		2

3. Additional private study/learning hours expected for students per week.	<input type="text"/>
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy
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	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Recognize the nomenclature of $\sigma$ -bonded and $\pi$ -bonded complexes.	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• Exams</li> <li>• web-based student performance systems</li> </ul>
1.2	Identify the eighteen electron rule and oxidation number		
1.3	Describe the preparation of $\sigma$ -bonded complexes: preparation of metal carbonyls and carbonyl anions		

1.4	Describe the methods of synthesis of organometallic compounds.		
1.5	Define Extrwion reaction.		
1.6	List the preparation methods and reactions of $\pi$ -bonded organometallic compounds		
1.7	State the structure and bonding in organometallic compounds.		
1.8	Memorize the application of organometallic compounds in organic preparations: organolithium compounds, organomagnesium compounds, organocopper compounds, organoaluminium compounds, organosilicon compounds, organoiron compounds		
2.0	<b>Cognitive Skills</b>		
2.1	Explain the nomenclature of $\sigma$ -bonded and $\pi$ -bonded organometallic compounds.	<ul style="list-style-type: none"><li>• Lectures</li><li>• Scientific discussion</li><li>• Library visits</li><li>• Web-based study</li></ul>	<ul style="list-style-type: none"><li>• Exams</li><li>• web-based student performance systems</li><li>• portfolios</li><li>• posters</li><li>• demonstrations</li></ul>
2.2	Apply the eighteen electron rule to the organometallic compounds.		
2.3	Preparation of $\sigma$ -bonded complexes: preparation of metal carbonyls and carbonyl anions		
2.4	Direct reactions between metals and alkyl halides		
2.5	Summarize the preparation methods of the organometallic compounds.		
2.6	Explain the structure and bonding in organometallic compounds.		
2.7	Interpret examples of organometallic compounds such as organolithium, organomagnesium, organocopper, organoaluminium, organosilicon, organoiron.		
3.0	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Use the IUPAC rules for nomenclature of organometallic	<ul style="list-style-type: none"><li>• Lectures</li></ul>	<ul style="list-style-type: none"><li>• Exams</li></ul>

	compounds	• Scientific discussion • Web-based study	• web-based student performance systems
3.2	Show the different synthesis methods and reactions of organometallic compounds		
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
4.1	Evaluate the different methods of preparation of organometallic compounds	• Lectures • Scientific discussion • Library visits • Web-based study	• web-based student performance systems • individual and group presentations
4.2	Illustrate synthetic methods and reactions of different organometallic compounds.		
<b>5.0</b>	<b>Psychomotor</b>		
5.1	NOT APPLICABLE		
5.2			

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5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Homework	--	10%
2	Midterm 1 Exam	--	20
3	Midterm 2 Exam	--	20
4	Final Exam	16	50%
	Total	100%	

#### D. Student Academic Counselling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)
<ul style="list-style-type: none"> <li>• <b>We have faculty members to provide counseling and advice.</b></li> <li>• <b>Office hours: During the working hours weekly.</b></li> <li>• <b>Academic Advising for students.</b></li> </ul>

#### E. Learning Resources

1. List Required Textbooks
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<ul style="list-style-type: none"> <li>J. D. Lee, Concise Inorganic Chemistry, Van Nostrand Reinhold Company, 1992, New York.</li> </ul>
2. List Essential References Materials (Journals, Reports, etc.)
<ul style="list-style-type: none"> <li>Lecture Hand outs available on the coordinator website.</li> </ul>
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
<ul style="list-style-type: none"> <li>J.C. Bailar, H.J. Emelens, H.J. Emelens, R. Nyholm and A.F. Trotman, Comprehensive Inorganic Chemistry, 1994, Pergaman press, Oxford.</li> <li>F.A. Cotton, G. Wilkinson, C.A. Murillo, M. Bochmann, Advanced Inorganic Chemistry: A comprehensive Inorganic Chemistry, 1994, Pergaman press- Oxford.</li> </ul>
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)
<ul style="list-style-type: none"> <li><a href="http://www.chemweb.com">http://www.chemweb.com</a></li> <li><a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a></li> <li><a href="http://www.rsc.org">http://www.rsc.org</a></li> </ul>
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

#### F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
<ul style="list-style-type: none"> <li><b>Classrooms capacity (30) students.</b></li> <li><b>Providing hall of teaching aids including computers and projector.</b></li> </ul>
2. Computing resources (AV, data show, Smart Board, software, etc.)
<ul style="list-style-type: none"> <li><b>Room equipped with computer and projector and TV.</b></li> </ul>
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)
<ul style="list-style-type: none"> <li><b>No other requirements.</b></li> </ul>

#### G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
Complete the questionnaire evaluation of the course in particular.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor
<ul style="list-style-type: none"> <li><b>Observations and the assistance of colleagues.</b></li> </ul>

- **Independent evaluation for extent to achieve students the standards.**
- **Independent advice of the duties and tasks.**

3 Processes for Improvement of Teaching

- **Workshops for teaching methods.**
- **Continuous training of member staff.**
- **Review of strategies proposed.**
- **Exchange of experiences internal and external.**

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

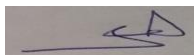
- **Check marking of a sample of exam papers, or student work.**
- **Exchange corrected sample of assignments or exam basis with another staff member for the same course in other faculty.**

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- **Periodic Review of the contents of the syllabus and modify the negatives.**
- **Consult other staff of the course.**
- **Hosting a visiting staff to evaluate of the course.**
- **Workshops for teachers of the course.**

Faculty or Teaching Staff: **Dr Hoda El-Ghamry**

Signature:



Date Report Completed: 2016

Received by: Dr Hatem

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Department Head

Signature: \_\_\_\_\_

Date:

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