



Course Specifications

Course Title:	Inorganic and Organometallic Chemistry
Course Code:	425CHEM-2
Program:	Bachelor of Science in Chemistry
Department:	Chemistry
College:	Science
Institution:	King Khalid University

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A. Course Identification

1. Credit hours: 2
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: Level 7 / Year 4
4. Pre-requisites for this course (if any): Chemistry of Transition Elements - 323CHEM
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	100%
2	Blended	0	0
3	E-learning	0	0
4	Correspondence	0	0
5	Other	0	0

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	30
Other Learning Hours*		
1	Study	10
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	0
5	Others (specify)	0
	Total	30

* 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

Spectroscopic studies and characterization of the molecular structure of the complexes in visible region, ultraviolet, infrared, nuclear magnetic resonance and magnetic properties. Studies the behavior of the organometallic compounds of transition metals as homogeneous and heterogeneous catalysis in important chemical reactions. The course is designed for science and other majors.

2. Course Main Objective

Studies of some theories in spectroscopic and magnetic methods to characterize the molecular structure of the complexes and organometallic for the transition metals.

- Problem solving skills, relating to qualitative and quantitative information
- E-Learning System is being introduced.
- Students can download course material which can be helpful for the students learning.
- For the reports, use internet such as Wikipedia, Googleetc.
- Interpersonal skills, relating to the ability to interact with other people and to engage in team-working through group discussion.
- Updating the contents of the syllabus
- Using different strategic teaching (white board and power point presentation)

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	To demonstrate knowledge of the fundamental concepts and principles of inorganic chemistry.	K1-K3
1.2	To acquire knowledge of spectroscopic studies and characterization of the molecular structure of the complexes.	K1-K3
1.3	To know the behavior and application of the organometallic compounds of transition metals as catalysts in important chemical reactions measurement.	K3
2	Skills :	
2.1	To deduce, interpret and explain the molecular structure and geometry of different inorganic compounds.	S1
2.2	To apply the spectroscopic techniques, basic concepts and principles of transition metals chemistry on the behavior of organometallic compounds	S2
3	Competence:	
3.1	To present an oral explanation for a subject in the area based on developing critical skills, observation, and feedback.	C1-C4
3.2	To interact positively with colleagues in a group work and to use online resources.	C4
3.3	To contribute with colleagues to prepare and deliver a presentation and report of group work	C1
3.4	To summarize the literature and sources for an area in the course.	C2

C. Course Content

No	List of Topics	Contact Hours
1	The Vector Model of Atoms and Russell - Saunders States: Electronic Spectroscopy of Transition Metals, Energy Levels in Multi-Electron Atoms Term Symbols, Hund's Rule, The Crystal Field Splitting of Russell – Saunders terms, Mulliken Symbols, Selections rule.	4
2	Energy level diagrams: Orgel, and Tanabe - Sugano diagrams, Jahn - Teller distortion.	2
3	Electronic absorption spectra: Examples on Electronic Transitions and Spectra of Metal Complexes.	2
4	Magnetism and methods of measurement: Different type of magnetisms (Para. and, Diamagnetism).	2

5	Application of spectral, and magnetic methods: Determining the molecular structures and isomers of complexes. (NMR) and (ESR) spectra of complexes.	4
6	Transition Metals Organometallic Chemistry: An Introduction, The Effective atomic number (EAN) principle, 16 and 18 electron rules and their relation with the organometallic compounds as Metal Carbonyls and isolobal principle.	6
7	Preperation and properties of metal carbonyls, carbonolate anions, carbonyl hydrides. nitrozy and dinitrogene compounds.	4
8	Preparation and determination of molecular structures and bonding types in the pentadienyl and metallocene compounds.	4
9	The rule of organometallic compounds as the homogeneous and heterogeneous catalysis.	2
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		
1.1	To demonstrate knowledge of the fundamental concepts and principles of inorganic chemistry	Lectures , Interactive teaching sessions	Written exams, oral discussion, electronic quizzes
1.2	To acquire knowledge of spectroscopic studies and characterization of the molecular structure of the complexes.	Lectures , Problem solving sessions	Written exams, electronic assignments
1.3	To know the behavior and application of the organometallic compounds of transition metals as catalysts in important chemical reactions measurement.	Lectures, Interactive teaching sessions	Written exams and electronic quizzes
2.0	Skills		
2.1	To deduce, interpret and explain the molecular structure and geometry of different inorganic compounds	Lectures, problem solving sessions	Written exams, oral discussion exams
2.2	To apply the spectroscopic techniques, basic concepts and principles of transition metals chemistry and the behavior of organometallic compounds	Lectures, problem solving sessions	Oral discussion, written examinations
3.0	Competence		
3.1	To present an oral explanation for a subject in the area based on developing critical skills, observation, and feedback.	opened essays on selected topics	Class activities
3.2	To interact positively with colleagues in a group work and to use online resources.	Interactive teaching sessions	Oral presentation on a group report
3.3	To contribute with colleagues to prepare and deliver a presentation and report of group work	Interactive teaching sessions	Discussion within a group

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.4	To summarize the literature and sources for an area in the course.	Guided reading of books and articles	Written Reports and summaries

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Electronic homework and quizzes	3,5,8,11	8%
	Oral discussion and Class activities	Depend on the lectures	2%
2	Midterm exam-1	7	20%
3	Midterm exam-2	13	20%
4	Final written 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 give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in the course: For this reason, instructor provides at least 10 office hours per week. My e-mail address is also used for any consultations during the vacations and also Blackboard.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> - Inorganic Chemistry by Gary L. Miessler & Donald A. Tarr, 5th Edition, 2014, Pearson (web) - E. Huheey, E. A. Keiter and R. L. Keiter, Inorganic Chemistry: Principle of Structures and Reactivity, Haper Collins College, 4th Edition, 1993. For part one (Inorganic). هيوهيهي ترجمة حمد الله الهودلي. " الكيمياء غير العضوية " - Christoph Elschenbroich, Organometallics, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 3rd Edition, 2006. For part two (Organometallics).
Essential References Materials	<ol style="list-style-type: none"> 1- James E. House, Inorganic Chemistry, Elsevier Inc., 1st edition, 2008, printed in Canada. 2- C. E. Housecroft, A. G. Sharpe, Inorganic Chemistry, 3rd Edition, 2008, Pearson education limited, England. 3- Advanced Inorganic Chemistry, E.A. Cotton and Wilkensen, 5th Ed. (1997).
Electronic Materials	<ol style="list-style-type: none"> 1- http://www.ilpi.com/organomet/organometallics.html 2- http://en.wikipedia.org/wiki/Organometallic_chemistry

	3- http://scholle.oc.uni-kiel.de/herges/modeling/gliederung.html
Other Learning Materials	Cases and handouts will be distributed to students

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Air-conditioned rooms (45 seats)
Technology Resources (AV, data show, Smart Board, software, etc.)	- Smart Board system with facile software
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	- Wireless Internet connection in class - Overhead projector - Chemdraw program

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course delivery (teaching methods and assessment methods)	Departmental Plan and curriculum committee; external reviewers	Reports and workshops
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department	Program Leader	Meetings
Course contents (update).	Departmental Plan and curriculum committee; external reviewers	Reports and workshops

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 counsel
Reference No.	1/22/142
Date	15-9-1442