

National Commission for Academic Accreditation & Assessment

Course Specification

Institution	KING KHALID UNIVERSITY
College/Department	College of Science – Department of Chemistry

A Course Identification and General Information

1. Course title and code:	Inorganic and Organometallic Chemistry – Chem 425
2. Credit hours:	2
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)	Bachelor Degree in Chemistry (BSc)
4. Name of faculty member responsible for the course	Dr. Ahmed Eid Fazary
5. Level/year at which this course is offered	Level 7 / 4th Year
6. Pre-requisites for this course (if any)	Chem 323
7. Co-requisites for this course (if any)	-
8. Location if not on main campus	-

B Objectives

<p>1. Summary of the main learning outcomes for students enrolled in the course.</p> <p>Studies of some theories in spectroscopic and magnetic methods to characterize the molecular structure of the complexes and organometallic for the transition metals.</p>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <ul style="list-style-type: none"> - E-Learning System is being introduced. - Students can download course material which can be helpful for the students learning. - For the research, 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. - Problem solving skills, relating to qualitative and quantitative information

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
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,	2	4
Energy level diagrams: Orgel, and Tanabe - Sugano diagrams, Jahn - Teller distortion.	2	4
Electronic absorption spectra: Examples on Electronic Transitions and Spectra of Metal Complexes.	1	2
Magnetism and methods of measurement: Different type of magnetisms (Para. and, Diamagnetism).	1	2
Application of spectral, and magnetic methods: Determining the molecular structures and isomers of complexes. (NMR) and (ESR) spectra of complexes.	1	2
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..	3	6
Preparation and properties of metal carbonyls, carbonolate anions, carbonyl hydrides. nitrozy and dinitrogen compounds.	2	4
Determination of molecular structures and bonding types in the pentadienyl and metallocene compounds.	2	4
The rule of organometallic compounds in the homogeneous and heterogeneous catalysis.	1	2

2 Course components (total contact hours per semester):				
Lecture: 30	Tutorial: 0	Laboratory 0	Practical/Field work/Internship	Other: 4

<p>3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)</p> <ul style="list-style-type: none"> - Assignments 4 Hrs - Blackboard and Internet 8 Hrs
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<p>4. Development of Learning Outcomes in Domains of Learning</p> <p>For each of the domains of learning shown below indicate:</p> <ul style="list-style-type: none"> • A brief summary of the knowledge or skill the course is intended to develop; • A description of the teaching strategies to be used in the course to develop that knowledge or skill; • The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.
<p>a. Knowledge</p>
<p>(i) Description of the knowledge to be acquired</p> <ul style="list-style-type: none"> - Spectroscopic studies and characterization of the molecular structure of the complexes - Know the behaviour and application of the organometallic compounds of transition metals as catalysts in important chemical reactions
<p>(ii) Teaching strategies to be used to develop that knowledge</p> <ul style="list-style-type: none"> - Class room lectures - Power point representations - Introductory lecture gives an overview of the content and significance of the course and of its relationship to students' existing knowledge. Each subsequent lecture begins with a similar overview linking the particular content of the presentation to the general overview. - Meeting individual students during office hours to solve their problems related to language learning, and encourages them to enjoy learning the new language. - Assignments - E-learning through university website

<p>(iii) Methods of assessment of knowledge acquired</p> <p>Questions may be in the form of: multiple choice, matching, fill in the blank, short answers, and problems</p> <p>Midterm Exams , Assignments, Final examination.</p>
<p>b. Cognitive Skills</p>
<p>(i) Description of cognitive skills to be developed</p> <ul style="list-style-type: none"> - The ability of understanding the basic concepts and principles of transition metals chemistry and the behaviour of organometallic compounds. - The ability to deduce the geometry and molecular structure of different inorganic compounds
<p>(ii) Teaching strategies to be used to develop these cognitive skills</p> <ul style="list-style-type: none"> - Assigning research questions that can be answered through collecting and analyzing data. - Solving questions related to the course from websites and text books.
<p>(iii) Methods of assessment of students cognitive skills</p> <ul style="list-style-type: none"> - Demonstrate knowledge and understanding of concepts, principles and theories relating to atomic structure and molecular bonding types - Discussing and evaluating the general properties of the organometallic compounds and its catalysis applications. - Assignments, Midterm & oral Exams and Final examination at the end of semester.
<p>c. Interpersonal Skills and Responsibility</p>
<p>(i) Description of the interpersonal skills and capacity to carry responsibility to be developed</p> <ul style="list-style-type: none"> - The essential components of communication skills are based on developing critical skills, observation, and feedback. - Encouraging students to use online resources. - Using the Internet to collect statistical data - Using Microsoft Office (e.g. Excel, Microsoft Access, front page) to analyze data and prepare statistical reports.
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> - An introductory lectures to the information the students need from the Pre-requisites for this course - Using PowerPoint (it's easy to cover more material quickly). - Group discussion and Online workshops

<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> - Assessment of group assignment includes component for individual contribution. - Providing feedback. - Encouraging self-assessment during the learning process.
<p>d. Communication, Information Technology and Numerical Skills</p>
<p>(i) Description of the skills to be developed in this domain..</p> <ul style="list-style-type: none"> - Ability of using computers. - Developing teamwork skills. - Collaboration to finish team assignments. - Presenting reports on their reading. - What relation of Data, Information, and Knowledge
<p>(ii) Teaching strategies to be used to develop these skills</p> <ul style="list-style-type: none"> - Debates - Group working. - Student assignments for writing and presenting skills for general chemistry concepts.
<p>(iii) Methods of assessment of students numerical and communication skills</p> <ul style="list-style-type: none"> - Instructor's feedback - Test questions require solving of simple and advanced general chemistry problems. - Assessments of student's assignments.
<p>e. Psychomotor Skills (if applicable)</p>
<p>(i) Description of the psychomotor skills to be developed and the level of performance required</p>
<p>(ii) Teaching strategies to be used to develop these skills</p>
<p>(iii) Methods of assessment of students psychomotor skills</p>

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm Examination – I	7	20%
2	Midterm Examination – II	14	20%
3	Assignments	6 & 13	10%
4	Final Examination	16	50%

D. Student Support

1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

The faculty member has 2 hours per week for these cases.

E Learning Resources

<p>1. Required Text(s)</p> <ul style="list-style-type: none">• 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). هيوهـي ترجمـة حمد الله الهودلي. " الكيمياء غير العضوية "• Christoph Elschenbroich, Organometallics, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 3rd Edition, 2006. For part two (Organometallics).
<p>2. Essential References</p> <ul style="list-style-type: none">• James E. House, Inorganic Chemistry, Elsevier Inc., 1st edition, 2008, printed in Canada.• C. E. Housecroft, A. G. Sharpe, Inorganic Chemistry, 3rd Edition, 2008, Pearson education limited, England.• Advanced Inorganic Chemistry, E.A. Cotton and Wilkensen, 5th Ed. (1997).
<p>3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)</p> <ul style="list-style-type: none">• U. Muller, "Inorganic Structural Chemistry", 2nd, John Wiley & Sons, New York, 2006.• R. S. Drago, "Physical Methods for Chemists", International Thomson Publishing, 2nd Edition, 1992.
<p>4-.Electronic Materials, Web Sites etc</p> <p>http://www.ilpi.com/organomet/organometallics.html</p> <p>http://en.wikipedia.org/wiki/Organometallic_chemistry</p>
<p>5- Other learning material such as computer-based programs/CD, professional standards/regulations</p> <p>Cases and handouts will be distributed to students</p> <p>http://scholle.oc.uni-kiel.de/herges/modeling/gliederung.html</p> <p>http://chem-faculty.ucsd.edu/trogler/GroupTheory224/Grouptheory.html</p>

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.) Number of seats in each class room – 20 Laboratories - 0 Accessories – Overhead projector
2. Computing resources MS-Office Software and Internet connection
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) Overhead projector Computer for individual students Internet access Isisdraw and Chemdraw and Chemoffice

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching <ul style="list-style-type: none">- Confidential completion of standard course evaluation questionnaire.- Focus group discussion with small groups of students.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department <ul style="list-style-type: none">- Observations and assistance from colleagues, independent assessment of standards achieved by students,- Independent advice on assignment tasks, etc.
3 Processes for Improvement of Teaching Developing the lectures periodically
4. Processes for Verifying Standards of Student Achievement (eg. 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) Meetings are conducting with teachers for checking the grading of the exams.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. <ul style="list-style-type: none">- Teachers' survey- Students' survey