ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Inorganic Reaction Mechanism and Spectra

4024573-2

Course Specifications
(CS)

Course Specifications

Institution: Umm Al-Qura University	Date of Report: 2017
College/Department : Faculty of Applied Science / Department of Chemistry	

A. Course Identification and General Information

1. Course title and code: Inorganic Reaction Mechanism and Spectra/**4024573-2**
2. Credit hours: 2 (theoretical)
3. Program(s) in which the course is offered: **Chemistry**
   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course: **Prof. Nashwa Mahmoud El-Metwaly**
5. Level/year at which this course is offered: seventh/fourth
6. Pre-requisites for this course (if any): **Coordination Chemistry**
7. Co-requisites for this course (if any): Nothing
8. Location if not on main campus: **both on El-Abedyah and El-Zaher**
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	■	What percentage? 100%	
b. Blended (traditional and online)		What percentage?	%
c. e-learning		What percentage?	
d. Correspondence		What percentage?	
f. Other		What percentage?	

Comments:

B. Objectives

1. What is the main purpose for this course? By the end of the study of this course students, will be aware fully with: a. The basic concepts of mechanism of inorganic reactions, including the substitution reactions of the ligands and some oxidation & reduction reactions. b. The basic concepts of the vibrational and electronic spectra of the transition metal complexes, which includes the charge transfer and ligand-field spectra.
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) - Using effective teaching in smart classes. - E-learning system is being introduced and the students can download course material which can be helpful for him. - Encourage students to make reports in the course subjects especially the spectra of transition metal complexes.

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
• Introduction on the basic concepts of inorganic reaction mechanism.	1	2
• The rate Laws for several inorganic chemistry reactions.	1	2
• Labile and inert complexes	1	2
• Reaction mechanisms of ligand substitution.	1	2
• Substitution reactions in square planar complexes, trans effect and the theories for it's explanation.	1	2
• Reactions include the substitution of coordinating wate	1	2

• Methods studying complexes reactions - octahedral & square- planar	1	2
• Substitution reactions in octahedral complexes - dissociation and association mechanisms - equation reactions.	1	2
• Aqueous ionic complexes, step wise complex formation, factors affecting the stability of complexes, acids and bases.	2	4
• Mechanism for oxidation-reduction reaction, inner sphere and outer sphere reactions.	2	4
• Introduction on the electronic spectra of transition metal complexes and Russell Saunders coupling effects.	1	2
• Energy level diagrams for different selective complexes.	1	2

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	28	4	0	0	0	32
Credit	2	0	0	0	0	2

3. Additional private study/learning hours expected for students per week.

- 2 additional hours.

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

- Brief summary of the knowledge or skill 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.

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Know several concepts and principles related to inorganic reaction mechanism such as complex geometries.	- Lectures using new techniques. - Meeting individual students and groups to solve their problems related to the course. - Assignments on E-learning.	- First Midterm Exam : 20 % - Second Midterm Exam: 20 % - Activities and assignments on e-learning site: 10 % - Final Exam: 50%
1.2	Recall the history and aims of studying inorganic reaction mechanism.		
1.3	Understand the chemical behavior of chemical compounds during chemical reactions.		
1.4	Know the scientific data and solving problems related to qualitative and quantitative information.		
2.0	**Cognitive Skills**		
2.1	Use the Internet for more information related to the course.	-Making connections between different concepts across the domains. - Using charts and concept maps. - Assigning research questions that can be answered through collecting and analyzing data. - Summarizing the findings of the online research	-Discussing and evaluating the topics that students learn from their textbooks and other sources. - Solving general chemistry problems related to qualitative and quantitative information at the end of each topic. - Individual assignments or oral exam for
2.2	Develop English language skills and symbolic thinking skills.		
2.3	Improve reasoning, perception, and intuition		
2.4	Develop attention, memory, self-regulation, and motor executive functions.		
2.5	Interpret, analyze, summarize, and evaluating the scientific materials.		
2.6	Demonstrate good understanding and retention of basic and advanced chemical principles.		

		- Class discussions. - Using the Internet to create learning activities.	developing/solving a task - Midterm Exams and Final examination at the end of semester.
3.0	**Interpersonal Skills & Responsibility**		
Not Applicable			
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicating personal ideas and thoughts	- using computer science in finishing reports and other related subjects - Group working. - Mini seminars prepared by the students to present their team projects or reports. - Visiting the University library and different web-sites to obtain some related subjects	-Follow up the project progress - Evaluation of the duties associated with the appropriate use of communication skills - Assessments of student's assignments - evaluate solving the equations and problems related to subjects
4.2	Responding to class discussions		
4.3	Developing teamwork skills		
4.4	Collaboration to finish team assignments		
4.5	What relation of Data, Information, and Knowledge		
5.0	**Psychomotor:** Not Applicable		

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 or activities.	--	10 %
2	First Periodic Exam.	6	20 %
3	Second Periodic Exam.	12	20 %

4	Final Exam. (2 hours exam)	16	50 %
5	**Total**	**100 %**	

D. Student Academic Counseling 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)

- Two office hours per week for each group of students.

E. Learning Resources

- Robert B. Jordan, Reaction Mechanisms of inorganic and organometallic systems, 3rd , Oxford University press, 2007
- Smiljko Asperger, Chemical Kinetics and inorganic reaction mechanisms, 2ed, Kluwer Academic / Plenum Publisher 2003
- Kazuo Nakamoto , Infrared and Raman Spectra of Inorganic and Coordination Compounds, John Wiley & Sons , 2009

2. List Essential References Materials (Journals, Reports, etc.)

"Kinetics and Mechanisms of Reaction of Transition Metal Complexes," Ralph G. Wilkins, 2nd Thoroughly Revised Edition, VCH Publishers, 1992, ISBN 9783527282531 (Online book access at http://onlinelibrary.wiley.com/book/10.1002/3527600825)

2- "Ligand Substitution Processes," C.H. Langford and H.B. Gray, W.A. Benjamin, Inc., 1966 (Online book access at http://caltechbook.library.caltech.edu/100/1/Langford_Lsp.pdf)

3- Lecture Synopsis at http://www.chem.ox.ac.uk/icl/dermot/mechanism1/

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

- Robert B. Jordan, Reaction Mechanisms of inorganic and organometallic systems, 3rd , Oxford University press, 2007
- Smiljko Asperger, Chemical Kinetics and inorganic reaction mechanisms, 2ed, Kluwer **Academic / Plenum Publisher 2003**
- Kazuo Nakamoto , Infrared and Raman Spectra of Inorganic and Coordination Compounds, John

Wiley & Sons , 2009
4. List Electronic Materials (eg. Web Sites, Social Media, etc.) 1- "Kinetics and Mechanisms of Reaction of Transition Metal Complexes," Ralph G. Wilkins, 2nd Thoroughly Revised Edition, VCH Publishers, 1992, ISBN 9783527282531 (Online book access at http://onlinelibrary.wiley.com/book/10.1002/3527600825) 2- "Ligand Substitution Processes," C.H. Langford and H.B. Gray, W.A. Benjamin, Inc., 1966 (Online book access at http://caltechbook.library.caltech.edu/100/1/Langford_Lsp.pdf) 3- Lecture Synopsis at http://www.chem.ox.ac.uk/icl/dermot/mechanism1/
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. - Isisdraw and Chemdraw and Chemoffice -MS-Office Software http://scholle.oc.uni-kiel.de/herges/modeling/gliederung.html http://phycomp.technion.ac.il/~ira/types.html

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.) - A classroom containing at multi seats and equipped with projector and Internet access (scheduled for 2 hours once a week).

2. Computing resources (AV, data show, Smart Board, software, etc.) - Common computer labs connected directly with internet are available for all students with high speed internet access
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) - Programs for chemical uses.

- Internet access for students.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching - Discussion groups of students to learn positives and negatives of all aspects of the scheduled Options. - Questionnaires assessing students and the work of statistics showing the extent of efficiency and take advantage of the scheduled
2. Other Strategies for Evaluation of Teaching by the Program/Department Instructor - Self assessments for performance from department - Continuous questioners conducted by University and introduce the results to each member to investigate it and take care with the comments - Independent review from specialists inside the department
3 Processes for Improvement of Teaching - Developing the subject topics periodically - Workshops on teaching methods. - Review of teaching strategies.
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. - Perform the necessary changes based on the feedback from the statistical analysis of the student grades. Periodic revision of the course from concerned parties in the department and college, and improving it

according to what is known in distinguished universities worldwide.

- Perform the necessary changes based on the feedback from the workshops, conferences, and seminars recommendations.
- Perform the necessary changes based on the feedback from the experts in the field and faculty members.

Faculty or Teaching Staff: Prof. Nashwa Mahmoud El-Metwaly

Signature: **Date Report Completed: 12/1/2019**

Received by: Dr. Ismail Althagafi **Department Head**

Signature: **Date: 20/1/2019**