Kingdom of Saudi Arabia

The National Commission for

Academic Accreditation & Assessment

Course Specifications

Mechanism of Reactions and Spectroscopy

(402427-2)

2016

Course Specifications

Institution: Umm Al-Qura University	Date of Report: 1436/1437
College/Department : Faculty of Applied Science / Chemistry Department	

A. Course Identification and General Information

1. Course title and code: Mechanism of Reactions and Spectroscopy / 402427-2
2. Credit hours: 2 (theoretical)
3. Program(s) in which the course is offered. Chemistry program
   (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 (402325-3)
7. Co-requisites for this course (if any): Nothing
8. Location if not on main campus: **All campus (El-Abedyah, El-Zaher and Elaziziah)**
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	☐	What percentage?	☐
b. Blended (traditional and online)	■	What percentage?	100
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 metal-ligand substitution reactions. b. The basic concepts of mechanism of oxidation-reduction reactions in metal complexes. c. The electronic spectra of the transition metal complexes, which includes the charge transfer and ligand-field spectra. d. Electronic energy levels of free ions and their complexes.
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) - 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 research, use internet such as Wikipedia, Google ....etc. - Interpersonal skills, relating to the ability to interact with other people and to engage in team- working through group discussion.

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 to reaction mechanism and spectroscopy and their importance	1	2
• Rate of Reaction and the rate law	1	2
• Labile and inert complexes	1	2
• kinetics and reaction mechanism of ionic complexes	1	2
• Some possible reaction mechanisms of ligand substitution	1	2

• Study the ratio in isomerism (Cis / Trans) in the reaction products	1	2
• Study substitution reactions $[Co(CN)_5X]^{-n}$ complexes type	1	2
• Reactions include the substitution of coordinating water	1	2
• Methods studying complexes reactions - Octahedral & square-planar	1	2
• Study the substitution reactions in square - planar complexes	1	2
• Oxidation- Reduction reactions	1	2
• The electronic spectra of transition metal complexes	1	2
• Electronic energy levels of free ions and their complexes	1	2
• Energy level diagrams & electronic spectra of complexes	1	2
• Electronic spectra of selective metal ion complexes	1	2

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

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	30	4	0	0	0	34
Credit	2	0	0	0	0	2

3. Additional private study/learning hours expected for students per week. 10

- Assignments 4 Hrs
- Tutorials 4 Hrs
- e-learning 2 Hrs

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	Learn the main concepts of inorganic mechanisms with some significant principles.	- Class room lectures - Assignments - Individual hand written assignments require use of library reference material and web sites to identify information required to complete tasks. - E-learning through university website	- Written tests - assess the effective participation of students during a lecture presentation - the duties given to e-learning site.
1.2	Know some history and aims about inorganic reaction mechanisms.		
1.3	Understand the process of chemical bonding and predict what type of bonds will form between different substances.		
1.4	know the scientific data in English and solving problems related to qualitative and quantitative information		
2.0	**Cognitive Skills**		
2.1	Must able to use the Internet for more information specially you tube	-Making connections between different concepts across the domains. - Assigning research questions that can be answered through collecting and analyzing data. - Summarizing the findings of the online research - Using the instructor's webpage learning activities.	- Assignments, Midterm Exams and Final examination at the end of semester. - Solving general chemistry problems related to qualitative and quantitative information at the end of each topic. - Individual assignments or
2.2	Have English language skills and symbolic thinking skills		
2.3	Participate with solving topic problems		
2.4	Deducts different important notice		
2.5	Interpret and Analyze data		
2.6	Compare between different issues		
2.7	Analyze the main issues in the topics		
2.8	Demonstrate good understanding and retention of basic and advanced chemical principles		

			oral exam for developing/solving a task
3.0	**Interpersonal Skills & Responsibility**		
3.1	Learn the ethics of communication with each others	-Using Power Point (it's easy to cover more material quickly). - Group discussion - Online workshops	Assessment of group assignment includes component for individual contribution. - Providing feedback. - Encouraging self-assessment during the learning process
3.2	Encourage students to use online resources		
3.3	Using the Internet to collect statistical data		
3.4	Deal with Microsoft Office (e.g. Excel, Microsoft Access, front page) to analyze data and prepare statistical reports		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate with each others	- Debates - Group working. - Mini seminars prepared by the students to present their team projects.	- Instructor's feedback - Final and midterms exams include different problems need numerical and technical skills
4.2	Responsible for class discussions		
4.3	Develop personal conjugation in teamwork		
4.4	Collaborate to finish team assignments		
4.5	Learn how to present reports or researches		
4.6	Use computational skills to learn by himself		
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	--	10%
2	Midterm 1 Exam	--	20
3	Midterm 2 Exam	--	20

4	Final Exam	16	50%
	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)

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

E. Learning Resources

1. List Required Textbooks

المعقدات و سلسلة العناصر الانتقالية الأولى : ديفيد نيكلز – ترجمة وسام عزيز 1984م

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

- F .Basolo and R .Pearson , Reaction Mechanisms of Inorganic Complexes , Butterworth ,London , 1992 .
- B .P Lever , Inorganic Electronic Spectroscopy , Longman , 1992 .

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

المعقدات و سلسلة العناصر الانتقالية الأولى : ديفيد نيكلز – ترجمة وسام عزيز 1984م

Reaction mechanisms of inorganic and organometallic systems", New York: Oxford University Press, 2007 ISBN 9780195301007

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

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 least 45 seats and equipped with projector and Internet access (scheduled for 2 hours once a week). - A help session classroom containing at least 45 seats and equipped with projector and Internet access (scheduled for 1 hours every week).

2. Computing resources (AV, data show, Smart Board, software, etc.) - Common computer lab containing at least 25 computer sets. - High speed internet access
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) - Chemdraw and Chemoffice - Computer for individual students - Internet access - Networked laboratory systems

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching - Confidential completion of standard course evaluation questionnaire. - Focus group discussion with small groups of students.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor - Observations and assistance from colleagues, independent assessment of standards achieved by students, - Independent advice on assignment tasks, etc.

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3 Processes for Improvement of Teaching

- Developing the lectures periodically
- Workshops on teaching methods.
- Review of recommended 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)

- Meetings are conducting with teachers for checking the grading of the exams
- 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.

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: Dr. Fawaz Ahmed Saad

Signature:  **Date Report Completed: 10/ 7/ 1437 H ; 17/4/2016**

Received by: **Dean/Department Head**

Signature: _____ **Date:**