

## COURSE SPECIFICATIONS

### Form

**Course Title: Mechanism of Inorganic Reactions**

**Course Code: 4026841-3**



Date: 23-10-2018

Institution: Umm Al-Qura University.

College: Faculty of Applied Science

Department: Department of Chemistry

### A. Course Identification and General Information

1. Course title and code: **Mechanism of Inorganic Reactions / 4026841-3**

2. Credit hours: **3 ( theoretical)**

3. Program(s) in which the course is offered: **M. Sc.in 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: **3<sup>rd</sup> / 2<sup>nd</sup>**

6. Pre-requisites for this course (if any): **None**

7. Co-requisites for this course (if any): **None**

8. Location if not on main campus: **El-Abedyah, El-Azizya, and El-Zaher**

9. Mode of Instruction (mark all that apply):

- |                                     |                                     |             |                                      |
|-------------------------------------|-------------------------------------|-------------|--------------------------------------|
| a. Traditional classroom            | <input type="checkbox"/>            | percentage? | <input type="checkbox"/>             |
| b. Blended (traditional and online) | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="70%"/> |
| c. E-learning                       | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="20%"/> |
| d. Correspondence                   | <input type="checkbox"/>            | percentage? | <input type="checkbox"/>             |
| f. Other                            | <input checked="" type="checkbox"/> | percentage? | <input type="checkbox" value="10%"/> |

Comments:

## B Objectives

### 1. The main objective of this course

The aim is to teach students basic mechanisms for inorganic reaction types, such as: electron transfer reactions, ligand substitution reactions and migration & insertion reactions, outer -Inner shell mechanism, conditions of mechanism reactions. Students must know how to use inorganic reaction mechanisms available in the literature to solve chemical problems.

### 2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online 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 learning.
- 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 used in the program's bulletin or handbook)

### Course Description:

### 1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
• Types of reactions, complexes formation constants and kinetics of reactions	2	6
• Substitution reactions in square planer	1	3
• Factors affecting on rate of water exchange reactions	1	3
• Substitution reactions in octahedral. Trans effect in substitution reaction	2	6
• Possible mechanisms of ligand exchange reactions. Charge transfer reactions.	2	6
• Migration and insertion reactions, outer -Inner shell mechanism. conditions of mechanism	2	6
• Reactions of coordinated ligands. Photochemical reactions of complexes.	2	6
• Catalyzed substitution reactions, addition of protons to metals	1	3

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	39	3	---	---	---	42
	Actual	39	3	---	---	---	42
Credit	Planned	3	---	---	---	---	3
	Actual	3	---	---	---	---	3

**3. Individual study/learning hours expected for students per week.**

3

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

On the table below are the five NQF Learning Domains, numbered in the left column.

**First**, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

**Curriculum Map**

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Know types of reactions, complexes formation constants and kinetics of reactions.	<ul style="list-style-type: none"> <li>Class room lectures.</li> <li>Individual handwritten assignments require use of library reference material and web sites to identify information required to complete tasks.</li> <li>E-learning through university website.</li> </ul>	<ul style="list-style-type: none"> <li>Written tests.</li> <li>Evaluate effective participation of students during lectures.</li> <li>Home work duties assigned in e-learning site.</li> </ul>
1.2	Describe the substitution reactions in square planer.		
1.3	Know factors affecting on rate of water exchange reactions.		
1.4	Recognize the substitution reactions in octahedral and trans effect in substitution reaction.		
1.5	Explain possible mechanisms of ligand exchange reactions and charge transfer reactions.		
1.6	Distinguish migration and insertion reactions, outer -inner shell mechanism, conditions of mechanism.		

1.7	Memorize photochemical reactions of complexes.		
1.8	Know catalyzed substitution reactions, addition of protons to metals.		
<b>2.0</b>	<b>Cognitive Skills</b>		
2.1	Compare between reactions types, complexes formation constants and kinetics of reactions.	<ul style="list-style-type: none"> <li>• Making connections between different concepts across the domains.</li> <li>• Assigning research questions that can be answered through collecting and analyzing data.</li> <li>• Summarizing the findings of online research</li> <li>• Using the instructor's webpage learning activities</li> </ul>	<ul style="list-style-type: none"> <li>• Solving general chemistry problems related to qualitative and quantitative information at the end of each topic.</li> <li>• Individual assignments or oral exam for developing/solving a task</li> </ul>
2.2	Discover factors affecting on rate of water exchange reactions.		
2.3	Apply substitution reactions in octahedral and trans effect in substitution reaction		
2.4	Interpret migration and insertion reactions, outer -inner shell mechanism, conditions of mechanism.		
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Exceed ethics for communication with each others.	<ul style="list-style-type: none"> <li>• Using Power Point (it's easy to cover more material quickly).</li> <li>• Group discussion.</li> <li>• Online workshops.</li> </ul>	<ul style="list-style-type: none"> <li>• Assessment of group assignment includes component for individual contribution.</li> </ul>
3.2	Encourage students to use online resources.		
3.3	Motivate them to use Internet for collecting statistical data.		
3.4	Guide students to deal with Microsoft Office (e.g. Excel, Microsoft Access, front page) to analyze data and prepare statistical reports.		
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
4.1	Able to communicate with his colleagues across all available tools.	<ul style="list-style-type: none"> <li>• Debates learning</li> <li>• Group working.</li> <li>• Mini seminars prepared by the students to present their team projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Instructor's feedback during study.</li> <li>• Final and midterms exams include different problems need numerical and</li> </ul>
4.2	Enrich the knowledge in information technology that will enable them to gather, interpret, and communicate information and ideas.		
4.3	Must have sufficient information about how to thinking to solve problems that will enable them		

	to apply in interpreting and proposing solutions.		technical skills
4.4	Communicate via the available electronic tools.		
4.5	Use of search engines across the Web.		
<b>5.0</b>	<b>Psychomotor(if any)</b>		
5.1	Not applicable.		
5.2			

<b>5. Assessment Task Schedule for Students During the Semester</b>			
	<b>Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)</b>	<b>Week Due</b>	<b>Proportion of Total Assessment</b>
1	<b>Assignments and activities.</b>	--	<b>10 %</b>
2	<b>Midterm Exam.</b>	<b>8</b>	<b>30 %</b>
3	<b>Final Exam.</b>	<b>15-16</b>	<b>60 %</b>
4	<b>Total</b>		<b>100 %</b>

## D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)
  - Office Hours: 3 hours
  - Total 3 hrs. of office hours for individual student consultations and academic advice per week in e-learning as mentioned before.

## E Learning Resources

1. List Required Textbooks
  - Rudi van Eldik and Colin D. Hubbard, "Inorganic Reaction Mechanisms" 1st ed. Elsevier, 2017.
  - Smiljko Ašperger, "Chemical Kinetics and Inorganic Reaction Mechanisms", 2<sup>nd</sup> ed., Springer, Boston, MA, 2003.
2. List Essential References Materials (Journals, Reports, etc.)
  - Journal of Coordination Chemistry.
  - Applied Organometallic Chemistry.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
  - <http://onlinelibrary.wiley.com/book/10.1002/3527600825>
  - <http://www.chem.ox.ac.uk/icl/dermot/mechanism1/>
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
  - Isisdraw and Chemdraw and Chemoffice Software.
  - <http://scholle.oc.uni-kiel.de/herges/modeling/gliederung.html>
  - <http://chem-faculty.ucsd.edu/trogler/GroupTheory224/Grouptheory.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.)
  - Smart classes are needed equipped with Internet access (scheduled for 3 hours once a week).
2. **Technology** 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)
  - Required programs specific for chemistry students.

## G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching.
  - Confidential completion of standard course evaluation questionnaire.
  - Focused group discussion with small groups of students.
  - Review with the department chairman.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department
  - Observations and assistance from colleagues.
  - Independent assessment of standards achieved by students.
  - Independent advice on assignment tasks.
3. Procedures for Teaching Development
  - Workshops on teaching methods.
  - Review of recommended teaching strategies.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)
  - 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 developing it.
  - 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.

**Name of Course Instructor: Prof. Nashwa Mahmoud El-Metwaly**

Signature: 

Date Completed: **23/10/2018**

**Program Coordinator: Dr. Ismail Ibrahim Althagafi**

Signature: 

Date Received: **24/10/2018**

