

ATTACHMENT 5.

Kingdom of Saudi Arabia

**The National Commission for Academic Accreditation &
Assessment**

T6. Course Specifications

(CS)

Physical Techniques in Inorganic Chemistry

(402722-2)



Course Specifications

Institution: Umm Al-qura University	Date: 2017
College/Department: Faculty of Applied Sciences / Department of Chemistry	

A. Course Identification and General Information

1. Course title and code: Physical Techniques in Inorganic Chemistry / 402722-2			
2. Credit hours: 2 (theoretical)			
3. Program(s) in which the course is offered.: Ph. D. 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. Dr. Nashwa El-Metwaly			
5. Level/year at which this course is offered : 2nd / 1st			
6. Pre-requisites for this course (if any): not applicable			
7. Co-requisites for this course (if any): not applicable			
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"/>	What percentage?	<input type="checkbox"/>
b. blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="70%"/>
c. e-learning	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="20%"/>
d. correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
f. other	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="10%"/>
Comments:			

B Objectives

<p>1. What is the main purpose for this course? Students must learn how to isolate pure inorganic compounds. How to use full spectral characterization for these compounds to illustrate their molecular and structural formulae.</p>
<p>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)</p> <ul style="list-style-type: none"> - Training with spectral techniques and solving related problems. - Intensive use of e- learning process. - Students can download course material which can be helpful for learning. - Interpersonal skills, relating to ability for interacting with other peoples and to engage in team-working through group discussion.

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours
Fourier transform infrared (FT-IR) spectral analysis.	2	4
Raman spectral analysis as complementary to infra-red absorption spectroscopy, but they have different selection rules	2	4
Electron spin resonance (ESR) and nuclear quadropole resonance (N.Q.R) spectral analysis	2	4
Mass spectral analysis.	1	2
Nuclear magnetic resonance (NMR) spectral analysis.	1	2
X-ray diffraction analysis as most powerful technique for inorganic chemists and X-ray single crystal.	3	6

Mössbauer spectroscopy.	2	4
-------------------------	---	---

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	26	4	0	0	0	30
Credit	2	0	0	0	0	

3. Additional private study/learning hours expected for students per week. 2

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

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 intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	Know basic information of IR spectral analysis of complexes	- Class room lectures - Assignments	- Written tests - Evaluate effective participation of students during lecture presentation
1.2	Describe how to discuss raman spectra of different complexes	- Individual handwritten assignments require	
1.3	Know types of coordination modes		

1.4	Recognize basic of ESR spectra of para-magnetic complexes	use of library reference material and web sites to identify information required to complete tasks. - E-learning through university website - Discussion in groups - Projects	- Home work duties assigned in e-learning site. - Projects -Teaching miniature
1.5	Explain spectra of definite complexes and calculate essential parameters		
1.6	Identify the bases of mass spectral analysis for inorganic compounds		
1.7	Know the illustration of NMR spectra for complexes		
1.8	Explain the technique for x-ray diffraction for solid complexes and Mössbauer spectra		
2.0	Cognitive Skills		
2.1	Compare between different complexes based on spectral analysis	-Making connections between different concepts across the domains. - Assigning research questions that can be answered through collecting and analyzing data. - Summarizing the findings of online research - Using instructor's webpage learning activities	Solving problems related to qualitative and quantitative information at the end of each topic. - Individual assignments or oral exam for developing/solving a task - Discussion
2.2	Discover factors affecting on modes of coordination		
	Apply on definite complexes		
	Interpret spectral data to abstract molecular and structural formulae		
3.0	Interpersonal Skills & Responsibility		

3.1	Exceed ethics for communication with each others	<ul style="list-style-type: none"> -Using Power Point (it's easy to cover more material quickly). - Group discussion - Online workshops - Suggesting research points 	<ul style="list-style-type: none"> -Assessment of group assignment includes component for individual contribution. - Providing feedback. - Encouraging self-assessment during learning process
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		
4.0	Communication, Information Technology, Numerical		
4.1	Able to communicate with his colleagues across all available tools	<ul style="list-style-type: none"> - Debates learning - Group working. - Mini seminars prepared by the students to present their team projects. 	<ul style="list-style-type: none"> - Instructor's feedback during study - Final and midterms exams include different problems need numerical and technical skills
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		
4.4	Communicate via the available electronic tools		
4.5	Use of search engines across the Web		
5.0	Psychomotor		

5.1	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	Assignments and activities.	--	10 %
2	Midterm Exam.	8	30 %
3	Final Exam.	15-16	60 %
4	Total		100 %

D. Student Academic Counseling and Support

<p>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)</p> <p>Office Hours: 3 hours</p> <p>Total 3 hrs. of office hours for individual student consultations and academic advice per week in e-learning as mentioned before.</p>
--

E Learning Resources

<p>1. List Required Textbooks</p> <ul style="list-style-type: none"> - R.S. Drago, <i>Physical Methods in Chemistry</i>, W. B. Saunders: Philadelphia, 1977. - E.A.V. Ebsworth, D.W. H. Rankin and S. Cradock, <i>Structural Methods in Inorganic Chemistry</i>, 2nd Ed. Blackwell Scientific Publications: Boston, 1991.
<p>2. List Essential References Materials (Journals, Reports, etc.)</p> <ul style="list-style-type: none"> - R.S. Drago, <i>Physical Methods in Chemistry</i>, W. B. Saunders: Philadelphia, 1977. - E.A.V. Ebsworth, D.W. H. Rankin and S. Cradock, <i>Structural Methods in Inorganic Chemistry</i>, 2nd Ed. Blackwell Scientific Publications: Boston, 1991.
<p>3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)</p> <ul style="list-style-type: none"> - E.A.V. Ebsworth, D.W. H. Rankin and S. Cradock, <i>Structural Methods in Inorganic</i>

Chemistry, 2nd Ed. Blackwell Scientific Publications: Boston, 1991

4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

" https://en.wikipedia.org/wiki/Infrared_spectroscopy

-<http://www.kinetics.nsc.ru/chichinin/books/spectroscopy/Stuart04.pdf>

-http://chem.libretexts.org/Core/Physical_and_Theoretical_Chemistry/Spectroscopy/Vibrational_Spectroscopy/Infrared_Spectroscopy/Infrared%3A_Theory

-https://books.google.com.sa/books?id=N7vVBwAAQBAJ&pg=PA106&lpg=PA106&dq=ESR+spectral+analysis+of+complexes&source=bl&ots=Wg6INWrNK2&sig=dfkd3XIPNezomziOI4sQIkyDk5M&hl=ar&sa=X&ved=0ahUKEwid0M_ZibDRAhWG4iYKHYEFCFgQ6AEIUzAG#v=onepage&q=ESR%20spectral%20analysis%20of%20complexes&f=false

- http://www.utdallas.edu/~scortes/ochem/OChem_Lab2/recit_notes/nmr2_proton.pdf

- https://en.wikipedia.org/wiki/Mass_spectrometry

- http://www.utdallas.edu/~scortes/ochem/OChem_Lab2/recit_notes/nmr2_proton.pdf

- https://en.wikipedia.org/wiki/Mass_spectrometry

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- **Isidraw 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. 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)

Required programs specific for chemistry students

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.- Focused group discussion with small groups of students.- Review with the department chairman.
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
3 Processes for Improvement of Teaching <ul style="list-style-type: none">- 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) <ul style="list-style-type: none">- 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. <ul style="list-style-type: none">- 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 Instructor: **Prof. Dr. Nashwa El-Metwaly**

Signature: _____ Date Report Completed: **10/4/1438h**

Name of Field Experience Teaching Staff :

Program Coordinator:

Signature:: _____ Date Received _____

