

Kingdom of Saudi Arabia

The National Commission for

Academic Accreditation & Assessment



Course Specifications

Chemistry of Solid State

(402428-3)

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: Chemistry of Solid State (402428-3)			
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	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
b. Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="60"/>
c. e-learning	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="40"/>
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
f. Other	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
Comments:			

B Objectives

1. What is the main purpose for this course?
<ul style="list-style-type: none"> • Study crystallography and their kinds. • Study the effect of X-ray on different crystals and its importance. • Study the crystallographic shapes and semiconductors.
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)
<ul style="list-style-type: none"> • Diversify teaching methods, such as using models for the different crystal system • Showing animation for explaining difficult concepts such as Band theory, conduction in metallic solids. • Continuous development to keep the contents of this course updated with the results of modern scientific research. • Activation of more e-learning with this course by the University's website.

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 Solid State Chemistry	1	3
How to study compounds by X-ray	1	3
Study of X-ray diffraction - rating case-quantitative analysis - the exact dimensions of the cell dimensions	1	3
Crystal definition - crystal Lattice - Types crystals- crystal Lattice of NaCl- crystal Lattice of CsCl- crystal Lattice of ZnS ₂ - crystal Lattice of nickel arsenate	2	6
Study compounds of MX ₂ formula - structural formula of CaCl ₂ and CdI ₂ and bonds comparison in-between.	2	6
Structural formula of ReO ₃ and Perovskite's (CaTiO ₃) (ABO ₃)	1	3
Crystal lattice levels, axes and Vin formula	1	3

Solid defects - Crystal imperfections and its types	1	3
Preparation of non-standard compounds - structural formula of ferrous oxide- immeasurability - Titanium oxide and immeasurability	1	3
Thermal Analysis TMA, DTA, TGA and its applications	2	6
Crystal structure of solids: Solid crystallography- covalent crystals - ionic crystals- cubic centered face- cubic centered body- Miller parameters- X-Ray crystallography (interference phenomenon and diffraction method) - X-ray diffraction in the crystal structure - absorption X-ray absorption- X-Ray spectrum - experimental crystal study (Lewis method - Rotatable crystal- powder diffraction)	2	6

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	45	4	0	0	0	49
Credit	3	0	0	0	0	3

3. Additional private study/learning hours expected for students per week.	2
1 hour for private study in solving problems.	
1 hour for homework assignment on black board.	

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy:
- 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 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
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1.0	Knowledge		
1.1	Understand the concepts of basic principles structures of solid state.	-Lectures. - Dialogue and discussion -Video shows -Models for Bravais lattices and lattice types	- Written tests - assess the effective participation of students during a lecture presentation - the duties given to e-learning site.
1.2	Know crystal system and their properties and how different between polymorphism and isomorphism		
1.3	Learn how to deal with Miller Indices of directions and planes		
1.4	Learn how to know the crystal defects, types of defects (point, line, surface) and how to calculate the concentrations of the defects according to types of defects.		
1.5	Understand how the metallic alloys formed from solid solutions		
1.6	Study everything about the cement industry		
2.0	Cognitive Skills		
2.1	Calculate the concentrations of the defects according to types of defects	-Display the problems for students in the framework of scheduled and directing them to solve it. -Taking relevant and search for topics and treatment	- By discussion and interactive note realize the extent of the student scientific material that displays - Written tests
2.2	Calculate Miller Indices at different directions and planes		
2.3	Identify crystal system and their properties such as no of molecules , coordination numbers for the different cubic systems		
3.0	Interpersonal Skills & Responsibility		
3.1	Guide student about ethics of dealing with his colleagues and with the instructors and supervisor	- The duties for individual students on the e-learning site where each student depends on himself -Action teams among the students to bring out the	-Assessment of assignments includes portion of
3.2	Encourage students towards responsibility for themselves and toward others.		
3.3	Encourage the work in group to make the		

	students aware with responsibility	lectures in line with what abstracted from the lecture and the present on the e-learning site	grade for effectiveness of investigation processes. - Personal performance in classroom.
3.4	Install self-learning character in the student		
4.0	Communication, Information Technology, Numerical		
4.1	Able to communicate with his colleagues across all available tools	-Applying the smart teaching assignments by using the e-learning tools. - Given 5 min at the end of each lecture to selected one of students to re-mentioned again the main topics introduced in lecture	- Final and midterms exams include different problems need numerical and technical skills - Develop degrees on the active participation of students in taking out en masse to some lectures
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 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%	

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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)

-Office Hours: 5 hours

Total 5 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

- R. S. Murray & P. R. Dawson, Structural and Comparative Inorganic Chemistry, London 197
- A. R. West, Solid State Chemistry and applications, John Wiley & Sons 1985

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

- A. R. West, Basic Solid State chemistry, John Wiley & Sons 1988
- W. Dietze, Crystals, Growth, Properties and applications, 1981
- D. McKie, Essential of Crystallography, 1986

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

- A. R. West, Solid State Chemistry and applications, John Wiley & Sons 1985
- A. R. West, Basic Solid State chemistry, John Wiley & Sons 1988

4. List Electronic Materials (eg. Web Sites, Social Media, etc.)

<http://www.mx.iucr.org/iucr-top/comm/cteach/pamphlets/13/node5.html>

<http://img.chem.ucl.ac.uk/sgp/mainmenu.htm>

www.shaf.ac.uk/.../solid-state-chemistry-applications-msc

www.simplybooks.in/solid-state-chemistry-its-anthony-r-book..

www.infibeam.com/.../solid-state-chemistry-its-applications/9...

<http://www.seas.upenn.edu/~chem101/sschem/solidstatechem.html>

<http://www.webqc.org/symmetry.php>

http://en.wikipedia.org/wiki/Molecular_geometry
http://en.wikipedia.org/wiki/Molecular_graphics
http://butane.chem.uiuc.edu/cyerkes/Chem102AEFa07/Lecture_Notes_102/newL102.htm-ecture%2014
/Science/Chemistry/Lewis_Structures_VSEPR
<http://www.wyzant.com/Help>
<http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro3.htm>
<drills.com/VSEPR.php>
<http://www.kiel.de/herges/modeling/gliederung.html>
<http://scholle.oc.uni-faculty.ucsd.edu/trogler/GroupTheory224/Grouptheory.html>
<http://chem-faculty.ucsd.edu/trogler/GroupTheory224/Grouptheory.html>
<http://www.seas.upenn.edu/~chem101/sschem/solidstatechem.html>
<http://phycomp.technion.ac.il/~ira/types.html>
http://en.wikipedia.org/wiki/Solid-state_chemistry
<http://www.shaf.ac.uk/.../solid-state-chemistry-applications-msc>
<http://www.simplybooks.in/solid-state-chemistry-its-anthony-r-book..>
<http://www.infibeam.com/.../solid-state-chemistry-its-applications/9...>
http://books.google.com.sa/books?id=-EKcm5UQaqEC&hl=ar&redir_esc=y

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://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.)

- 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)

- Isisdraw and 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.

- Focused group discussion with small groups of students.

- Review with the department chairman.

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

3 Processes for Improvement of Teaching

- Workshops on teaching methods.

- Review of recommended teaching strategies.

- Periodical department revisions on its methods of teaching by experts on the teaching.

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 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.

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5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- 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 statistical analysis of the student grades.
- 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: Professor Nashwa Mahmoud El-Metwaly

Signature:



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

Received by: _____ Dean/Department Head

Signature: _____ Date: