COURSE SPECIFICATIONS
Form

Course Title: Solid State Chemistry

Course Code: 4026823-3

Date: 22-10-2018	**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: **Solid State Chemistry / 4026823-3**
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: **2nd / 1st**
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		percentage?	
b. Blended (traditional and online)	■	percentage?	70%
c. E-learning	■	percentage?	30%
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

This course aims to knowing the following: fundamentals regarding the solid state, including selected structural examples. Theoretical and practical crystallography. Unary and binary phase diagrams. X-ray diffraction, thermal analysis and introduction to other characterization techniques.

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)

- The use of smart teaching halls for lectures.
- Increased use of IT or web based reference material.
- Encourage students to carry out research reports in different subjects of the course using the library, data base services, and/or websites.
- Changes in content as a result of new research in the field.

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
• The principles concerning solid state structures.	2	6
• Describing specific crystal structures by applying basic crystallographic concepts.	2	6
• The generation of X-ray radiation and its effects on matter.	2	6
• The experimental use of the diffraction phenomenon.	2	6
• Using powder diffraction data for characterizing cubic substances.	1	3
• Relating diffraction intensities mathematically to structural parameters and derive extinction conditions.	2	6
• Using crystallographic data for a validated phase analysis.	1	3
• Analyzing thermograms and phase diagrams in known systems.	1	3

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

	Lecture	Tutorial	Laboratory/	Practical	Other	Total

				Studio			
Contact Hours	Planned	39	**3**	---	---	---	42
	Actual	39	**3**	---	---	---	42
Credit	Planned	3	---	---	---	---	3
	Actual	3	---	---	---	---	3

3. Individualstudy/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
1.0	**Knowledge**		
1.1	Describe the principles of solid state structures	• Using open discussion to link the previous knowledge to the current and future topics. • The students use the internet to prepare an essay about recent advances related to the course.	• Written tests. • Evaluate effective participation of students during lecture presentation. • Home work duties assigned in e-learning site.
1.2	Identify crystal structures by applying basic crystallographic concepts		
1.3	Know the process for generation of X-ray radiation and its effects on matter		
1.4	Recognize the experimental use of the diffraction phenomenon		
1.5	Explain how to use powder diffraction data for characterizing cubic substances		
1.6	Understand diffraction intensities mathematically to structural parameters and derive extinction conditions		
1.7	Memorize the use of crystallographic data for a validated phase analysis		

1.8	Know how to analyze thermo-grams and phase diagrams in known systems		
2.0	**Cognitive Skills**		
2.1	Compare between different crystals.	• Using brain storming at the beginning of each lecture in order to stimulate the students towards the new topic of the course. • Enhancing open discussion during the lecture.	• Discussion and interactive note realize the extent of the student scientific material that displays • Written tests
2.2	Discover experimental use of the diffraction phenomenon		
2.3	Apply how to use powder diffraction data for characterizing cubic substances		
2.4	Interpret crystallographic data for a validated phase analysis		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Encourage students towards responsibility for themselves and toward others.	• Duties for individual students on e-learning site where each student depends on himself • Encourage the solving problems in groups during lecture. • Making open discussion about certain recent topic of the course.	• Assessment of assignments includes portion of grade for effectiveness of investigation processes. • Personal performance in classroom.
3.2	Encourage the work in group to make the students aware with responsibility		
3.3	Install self-learning character in the student		
3.4	Guide student about ethics of dealing with his colleagues and with the instructors and supervisor		
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.
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(if any)**		

5.1 5.2	Not applicable.

5. Assessment Task Schedule for Students During the Semester			
	Assessment task (i.e., essay, test, quizzes, 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

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

- Anthony R. West, Solid State Chemistry and its Applications, 2nd ed., Wiley, 2014.
- Amnon Aharony and Ora Entin-Wohlman "Introduction to Solid State Physics", World Scientific Publishing, 2018.

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

- Journal of Solid State Chemistry.
- Solid State Science

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

- http://www.mx.iucr.org/iucr-top/comm/cteach/pamphlets/13/node5.html
- http://img.chem.ucl.ac.uk/sgp/mainmenu.htm
- http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro3.htm
- www.shef.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...

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: 22/10/2018**

Program Coordinator: Dr. Ismail Ibrahim Althagafi

Signature: **Date Received: 23/10/2018**