



Course Syllabus: Crystallography and Diffraction - MSE 301

Division	UOAH
Course Number	TUOAH
Course Title	Crystallography and Diffraction
Academic Semester	Spring
Academic Year	2016-2017
Semester Start Date	February 2017
Semester End Date	May 2017
Class Schedule	Monday 9:00 AM - 10:30 AM

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Dr. Ali Al-Jarrah	aljarrah@uoi.edu.sa	9740 1234 5678	Engineering Building 301	Monday 10:00 AM - 12:00 PM
Dr. Sara Al-Murayri	almurayri@uoi.edu.sa	9740 1234 5678	Engineering Building 301	Monday 10:00 AM - 12:00 PM

Teaching Assistant(s)	
Name	Email
Dr. Ali Al-Jarrah	aljarrah@uoi.edu.sa

Course Information	
Comprehensive Course Description	<p>This course provides a comprehensive overview of the principles and applications of crystallography and diffraction. The course covers the fundamentals of crystal structure, X-ray diffraction, electron diffraction, and neutron diffraction. It also discusses the applications of these techniques in materials science, chemistry, and physics.</p> <p>The course is designed for students with a background in materials science or physics. It is a required course for students in the Materials Science and Engineering program.</p>
Course Description from Program Guide	<p>This course provides a comprehensive overview of the principles and applications of crystallography and diffraction. The course covers the fundamentals of crystal structure, X-ray diffraction, electron diffraction, and neutron diffraction. It also discusses the applications of these techniques in materials science, chemistry, and physics.</p> <p>The course is designed for students with a background in materials science or physics. It is a required course for students in the Materials Science and Engineering program.</p>

Goals and Objectives	At the end of this course students should be able to: <ul style="list-style-type: none"> •Define concepts such as lattice, point and space groups •Be familiar with Bragg's Law and explain its relation to crystal structure •Identify and describe different diffraction methods •Interpret and assign X-ray and electron diffraction patterns
Required Knowledge	Students are expected to have successfully completed, or be familiar with the contents of, Fundamentals of Materials Science (KAUST 200-level class). Helpful background reading about materials: <i>Materials Science and Engineering: An Introduction</i> (7th. Ed.), by W. D. Calister, John Wiley and Sons; ISBN: 0-471-73696-1.
Reference Texts	Primary: C. Hammond, <i>The Basics of Crystallography and Diffraction</i> , Oxford University Press, 2009. Secondary: G.S. Rohrer, <i>Structure and Bonding in Crystalline Materials</i> . Cambridge University Press, 2001.
Method of evaluation	30.00% - Final exam 20.00% - Presentation 30.00% - Midterm exam 20.00% - Homework /Assignments
Nature of the assignments	The student will be expected to read the primary textbook in advance of lectures. Two homeworks will be given during the semester and the student will be expected to give a presentation on an advanced topic related to the course, for which there will be time set aside during class hours for guidance.
Course Policies	The graduate student is expected to be independent and get more information by him/herself. Plagiarism and references: Always cite references and attribute the work. Students should attend all lectures. Frequent absence will be penalized up to 5% of the final grade).
Additional Information	The instructors reserve the right to make changes to the syllabus and schedule of lectures.

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	T [] AEDEBA Wed 01/25 ////////	on 23 Jan: Discussion of syllabus and introduction to crystallography Wed 25 Jan: Materials background I
2	T [] AEDEBA Wed 02/01 ////////	on 30 Jan: Materials background II Wed 1 Feb: 1D and 2 D patterns, lattices and symmetries
3	T [] AEDEBA Wed 02/08 ////////	on 6 Feb: Bravais lattices and their symmetries I Wed 8 Feb: Bravais lattices and their symmetries II
4	T [] AEDEBA Wed 02/15 ////////	on 13 Feb: Crystal symmetry, point groups and space groups I Wed 15 Feb: Crystal symmetry, point groups and space groups II
5	T [] AEDEBA Wed 02/22 ////////	on 20 Feb: Crystal symmetry, point groups and space groups III Wed 22 Feb: Crystal symmetry, point groups and space groups IV
6	T [] AEDEBA Wed 03/01 ////////	on 27 Feb: Session with librarian (tentative) Wed 1 Mar: Discussion of topical projects I
7	T [] AEDEBA Wed 03/08 ////////	on 6 Mar: Mid-term exam Wed 8 Mar: Properties of crystals
8	T [] AEDEBA Wed 03/15 ////////	on 13 Mar: Reciprocal lattice I Wed 15 Mar: Reciprocal lattice II
9	T [] AEDEBA Wed 03/22 ////////	on 20 Mar: Discussion of topical projects II Wed 22 Mar: Diffraction of X-rays I
10	T [] AEDEBA Wed 03/29 ////////	on 27 Mar: Diffraction of X-rays II Wed 29 Mar: Electron diffraction I
11	T [] AEDEBA Wed 04/05 ////////	on 3 Apr: Spring Break Wed 5 Apr: Spring Break
12	T [] AEDEBA Wed 04/12 ////////	on 10 Apr: Electron diffraction II Wed 12 Apr: Electron diffraction III
13	T [] AEDEBA Wed 04/19 ////////	on 17 Apr: Neutron diffraction Wed 19 Apr: Discussion of topical project III
14	T [] AEDEBA Wed 04/26 ////////	on 24 Apr: Practical aspects of X-ray diffraction Wed 26 Apr: Student presentations I
15	T [] AEDEBA Wed 05/03 ////////	on 1 May: Student presentations II Wed 3 May: Student presentations III
16	T [] AEDEBA Wed 05/10 ////////	on 8 May: Revisions Wed 10 May: Revisions
17	T [] AEDEBA Wed 05/17 ////////	on 15 May: Final exams week Wed 17 May: Final exams week
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Note

The instructor reserves the right to make changes to this syllabus as necessary.