



Course Syllabus: Material Chemistry II - ChemS 250

Division	Physical Science and Engineering Division
Course Number	ChemS 250
Course Title	Material Chemistry II
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (Days & Time)	01:00 PM - 02:30 PM Sun Mon

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Yu Han	yu.han@kaust.edu.sa	+966128082407	4221, 4, Al-Jazri (bldg. 4)	Wednesday 1:30 ¾ 4:30 pm (Building 4, Level 4, room 4221) and also by appointment (preferably via e- mail)

Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	The course is designed to give students an introduction to various electron microscopy based techniques including scanning electron microscopy (SEM), transmission electron microscopy (TEM), scanning transmission electron microscopy (STEM), energy dispersive X-ray analysis (EDX), and electron energy loss spectroscopy (EELS). The electron diffraction (ED) section will feature the fundamental principles concerning "real space" and "reciprocal space" and their correlations; and will permit students to be able to index simple ED patterns of known crystalline structures. Furthermore, on-site demonstrations for SEM and (S)TEM will be arranged for better understanding the knowledge gained in the regular classes.
Course Description from Program Guide	This course will introduce electron microscopy based techniques: Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Electron diffraction (ED), Scanning transmission electron microscopy (STEM), Energy--filtered TEM (EFTEM), Energy dispersive X- ray analysis (EDX), and Electron energy loss spectroscopy (EELS). On--site demonstration of the electron microscope will be given.
Goals and Objectives	This course is designed to impart students with knowledges on basic working principles of various electron microscopic techniques including SEM, TEM, STEM, EDS and EELS, with emphasis on the similarities and differences between various relevant techniques. At the end of the course, the students should be able to index electron diffraction patterns of known structures independently.
Required Knowledge	Basic physics and crystallography
Reference Texts	Recommended Textbook (for reference only): - <i>"Transmission Electron Microscopy - A Textbook for Materials Science"</i> David B. Williams and C. Barry Carter, Springer, 2008

Method of evaluation	40.00% - Final exam 30.00% - Scientific review article presentation 30.00% - Midterm exam
Nature of the assignments	Exams and Presentation: A total of two exams will be given, one mid-term and one final exam. Besides, each student will be assigned a topic relevant to the course taken, i.e. on electron microscopy. They will be expected to give a 20 minute presentation using up to 20 slides.
Course Policies	Attendance Policy: Attendance to class is expected. If any class session is missed, it is the responsibility of the student to find out if any assignments or schedule changes were made during the missed class.
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/28/2018	explain the syllabus
1	Mon 01/29/2018	Introduction to electron microscopy
2	Sun 02/04/2018	Scanning electron microscopy (SEM)
2	Mon 02/05/2018	Scanning electron microscopy (SEM)
3	Sun 02/11/2018	Scanning electron microscopy (SEM)
3	Mon 02/12/2018	Transmission electron microscopy (TEM)
4	Sun 02/18/2018	Transmission electron microscopy (TEM)
4	Mon 02/19/2018	Transmission electron microscopy (TEM)
5	Sun 02/25/2018	Scanning transmission electron microscopy (STEM)
5	Mon 02/26/2018	Scanning transmission electron microscopy (STEM)
6	Sun 03/04/2018	Energy dispersive X-ray spectroscopy (EDS)
6	Mon 03/05/2018	Energy dispersive X-ray spectroscopy (EDS)
7	Sun 03/11/2018	Electron energy loss spectroscopy (EELS)
7	Mon 03/12/2018	Electron energy loss spectroscopy (EELS)
8	Sun 03/18/2018	Electron diffraction (ED)
8	Mon 03/19/2018	Electron diffraction (ED)
9	Sun 03/25/2018	Electron diffraction (ED)
9	Mon 03/26/2018	Electron diffraction (ED)
10	Sun 04/01/2018	No class
10	Mon 04/02/2018	No class
11	Sun 04/08/2018	Electron diffraction (ED)
11	Mon 04/09/2018	SEM demonstration in the core lab
12	Sun 04/15/2018	SEM demonstration in the core lab
12	Mon 04/16/2018	SEM demonstration in the core lab
13	Sun 04/22/2018	TEM demonstration in the core lab
13	Mon 04/23/2018	TEM demonstration in the core lab
14	Sun 04/29/2018	TEM demonstration in the core lab
14	Mon 04/30/2018	Student presentations
15	Sun 05/06/2018	Student presentations
15	Mon 05/07/2018	Student presentations
16	Sun 05/13/2018	Student presentations
16	Mon 05/14/2018	Student presentations
17	Sun 05/20/2018	Final exam
17	Mon 05/21/2018	No class

Note

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