

MSE 562 Winter 2014 Syllabus and Lab Schedule

FH = Fultz and Howe

#	Date	Topic	Reading Assignment
1	Jan 8	X-ray diffraction	FH Ch.1.1-1.2
2	Jan 13	TEM and Optics: Lenses, Modes TEM optics	FH Ch.2
Lab 1	Jan 14	Tour of EMAL	
3	Jan 15	TEM and Optics: Glass, Magnetic, Aberrations, Resolution	Microscope Handbook
	Jan 20	MLK day, No Class	
Lab 2	Jan 21	How to Align a TEM - 3011	
4	Jan 22	SEM and FIB	TBD
5	Jan 27	Scattering	FH 4.1
Lab 3	Jan 28	Class cancelled by Provost because of weather	
6	Jan 29	Elastic and Inelastic Scattering and Fourier Transforms	FH 4.3
7	Feb 3	Diffraction from Crystals 1 and Fourier Transforms	FH 6.1-6.2
Lab 4	Feb 4	FIB and sample prep - Nova	
8	Feb 5	Diffraction from Crystals 2	FH 6.3-6.5
9	Feb 10	Diffraction from Crystals 3	FH 6.5-6.9
Lab 5	Feb 11	Diffraction in the TEM - an introduction: TED from a polycrystalline metal (double diffraction, phase identification, grain size) (plan view) - 3011	
10	Feb 12	Electron Diffraction and Crystallography 1	FH 7.1-7.2
11	Feb 17	Electron Diffraction and Crystallography 2	FH 7.3-7.4

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Lab 6	Feb 18	Diffraction from a single crystal with an epitaxial layer grown on top (plan view) and Kikuchi patterns - 3011	
12	Feb 19	Amplitude and Phase contrast	FH 8.1-8.6
13	Feb 24	Phase, Thickness and Bending Contrast	FH 8.7-8.10
Lab 7	Feb 25	EBSD on the SEM - XL30	
Exam 1	Feb 26	Covers all material through lecture 13 and Lab 6	
	Mar 3,4, and 5	Spring Break, No Class	
14	Mar 10	Planar Defects, Strain Fields and Weak Beam	FH 8.11-8.14
Lab 8	Mar 11	Imaging a single crystal, Dark Field/Weak Beam Imaging, thickness fringes, strain contrast - 3011	
15	Mar 12	Sample preparation and FIB 1	TBD
16	Mar 17	High Resolution TEM and STEM	FH 11.1-11.2, FH 12.1-12.2
Lab 9	Mar 18	Stacking faults, dislocation loops, G dot B analysis and Moire fringes - 3011 or 2010	
17	Mar 19	High Resolution STEM continued	FH 12.3-12.7
18	Mar 24	Sample Preparation and FIB 2	TBD
Lab 10	Mar 25	STEM Imaging - 2100	
19	Mar 26	Inelastic scattering and EELS	FH 5-1-5.3
20	Mar 31	Inelastic scattering and EELS continued	FH 5.4-5.5
Lab 11	Apr 1	STEM compared to High Resolution Imaging - 3011 and 2100	

#	Date	Topic	Reading Assignment
21	Apr 2	Atom probe microscopy	TBD
22	Apr 7	X-ray fluorescence	FH 5.6-5.7
Lab 12	Apr 8	EELS, GIF, STEM EELS - 2100 or 2010	
23	Apr 9	SEM methods	TBD
Exam 2	Apr 14	Exam 2: Covers Lectures 12 through 23 and Labs 7 through 12.	
Lab 13	Apr 15	XEDS in SEM (Quanta or Nova)	
24	Apr 16	Why use a TEM when you have an SEM?	TBD
	Apr 21	Open	