Stockholm University
Department of Materials and Environmental Chemistry

Advanced transmission electron microscopy
Sept 27 – Oct 27, 2017

KZ8010 7.5hp http://sisu.it.secure.su.se/search/info/KZ8010/en

The course will start on September 27(Wednesday) at 9:15 in room C516 (5Ö), Arrhenius Laboratory, Stockholm University.
Lectures, problem solutions and practical training sessions are conducted at 9:15-12:00 and 13:00-16:00 according to the detailed schedule below.
Demonstrations, problem solutions, practical training sessions and group project are the ***compulsory parts*** in the course.

Teachers:
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Teaching assistants:
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(Yulia Trushkina yulia.trushkina@mmk.su.se) if there are three groups

Literature:
WC: *Transmission Electron Microscopy: A Textbook for Materials Science*, D.B.Williams and C.B.Carter, Springer
ZHO: *Electron Crystallography - Electron microscopy and electron diffraction*, X. Zou, S. Hovmöller and P. Oleynikov, Oxford University Press
* Additional materials may be given in the lectures and practical sessions.
# The actual date of lab and exercise depends on the number of participants and will be finalized at the beginning of the course.

Week	Date		Teacher	Lecture (9:15 – 12:00)	Literature	Lab (13:00-16:00) #
39	27/9 (Wed)		XZ	General introduction		
		L1	XZ	Basics of electron crystallography-methods for structure solution	ZHO 1-3, 9	Group project – sample preparation
	29/9 (Fri)	L2	XZ	New electron diffraction techniques and quantification of electron diffraction	ZHO 5	Computer lab: RED data processing – obtain ED data for structure solution
40	3/10 (Tue)	L3	XD	Structure determination and refinement from SAED -SHELX	ZHO 8-9	Group 1 project – ED and cRED data collection‡
	4/10 (Wed)	L4	TT	Kikuchi Pattern, CBED	WC19-21	Group 2 project – ED and cRED data collection‡
	6/10 (Fri)	L5	TT	Various image contrasts - thickness and Bend contours	WC23	Computer lab: Structure determination from RED data
41	10/10 (Tue)	L6	TW	Defects (stacking fault, dislocation)	WC25-26	Group project – ED and cRED data analysis
	11/10 (Wed)	L7	TW	Quantification and processing of HRTEM images	ZHO 6-7	Computer lab: Structure determination from HRTEM
	13/10 (Fri)	L8	TW	3D reconstruction by electron tomography and electron crystallography	ZHO 11*	Group project 1 – HRTEM data collection‡
42	17/10 (Tue)	L9	TT	STEM (BF, ADF & HAADF)	WC31*	Group project 2 – HRTEM data collection‡
	18/10 (Wed)	L10	TT	STEM (BF, ADF & HAADF), Electron energy loss spectroscopy (EELS)	WC31* WC37-40*	Group project – HRTEM data analysis
	19/10 (Thu)					
	20/10 (Fri)	L11	TT	Electron energy loss spectroscopy (EELS)	WC37-40*	Demonstration STEM + EELS‡
43	24/10 (Tue)	L12	TT	Electron energy loss spectroscopy (EELS), data treatment	WC37-40*	Demonstration STEM+EELS‡
	25/10 (Wed)	**Project Presentation (9:15-12:00)**				
	27/10 (Fri)	**Examination (9:15-14:00)**				

‡ Students will be divided in groups and each group only needs to take one ED data collection and one HRTEM data collection session.