

Advanced Transmission Electron Microscopy

May 2 – June 2, 2023

KZ41011, 7.5 hp

The course gives an overview of several important methods for characterization of materials by transmission electron microscopy. The overall aim is to provide a deep knowledge how to accurately obtain and analyse the data. The course will cover the theoretical background of important techniques in the transmission electron microscope such as STEM images, different types of diffraction patterns, spectroscopic data and electron tomography. The course will also introduce the practical aspects of obtaining and analysing data and will offer hands-on experience.

The course includes two parts:

- 1) Theory, 3.5 hp
- 2) Practical sessions and Project, 4 hp

The course includes two compulsory individual assignments:

- 1) home-assignment covering the theory part
- 2) project report; written and oral presentation

Participation in practical sessions and project work are compulsory.

Teachers:

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Course Responsible:

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Literature:

WC: *Transmission Electron Microscopy: A Textbook for Materials Science*, D.B. Williams and C.B. Carter, 2nd edition, 2009, Springer. <https://libris.kb.se/bib/11775751>
Additional content handed out.

Lecture	Room C516
Practical	Room C513

Date	Teacher	Morning 9:15 – 12:00	Chapter	Afternoon 13.15 – 16.00
2/5	TW CWT	Introduction L1: Instrumentation and electron-optics (Aberration-correction)		
3/5				
4/5	CWT	L2: Elastic and inelastic scattering – theoretical and practical aspects		
5/5	TW	L3: Electron diffraction beyond SAED (CBED, LACBED, TKD, etc)		P1: Project introduction
8/5	TW	L4: STEM – BF, ABF, ADF & HAADF, iDPC, DPC		P2: STEM (Group A)
9/5				P2: STEM (Group B)
10/5	TW	L5: 4D-STEM, ptychography		P4: Data analysis STEM
11/5				P3: 4D-STEM (Group A)
12/5				P3: 4D-STEM (Group B)
15/5	TY	L6: Electron tomography		P7: Tomography (Group A)
16/5				P7: Tomography (Group B)
17/5				P6: Data analysis 4D-STEM
18/5				
19/5				
22/5	CWT	L7: EELS & EFTEM and their applications		P8: Data analysis Tomography
23/5	CWT	L8: EELS & EFTEM and their applications		P9: EELS/EFTEM (Group A)
24/5				P9: EELS/EFTEM (Group B)
25/5				P10: Data analysis EELS/EFTEM
26/5				
29/5				P11: Extra session Data analysis
30/5				
31/5		P12: Project presentations		
1/6				
2/6		Hand in assignment		