FMH3924 Introduction to High-performance Scanning Electron Microscopy in Materials Science with Focus on Metallurgy 6.0 credits

Introduktion till svepelektronmikroskopi inom materialvetenskap med fokus på metalliska material

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

On 03/06/2022, the Dean of the ITM School has decided to establish this official course syllabus to apply from spring term 2022 (registration number M-2022-0986).

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course the student should be able to:

- Understand scientific literature in the field of scanning electron microscopy (SEM) to further develop in SEM characterization by themselves
- Perform basic SEM operation and data analysis
- Explain the fundamentals of SEM and its applications in materials science with special emphasis on metallurgy
- Account for an overview of the state-of-the-art in SEM

Course contents

Lectures will cover the following topics: the scanning electron microscope, interaction between electron beam and sample, diffraction, sample preparation, imaging in secondary electron and backscattered electron modes, chemical analysis using energy-dispersive x-ray spectroscopy (EDS) and wavelength-dispersive x-ray spectroscopy (WDS), electron channeling contrast imaging (ECCI), electron backscatter diffraction (EBSD), transmission Kikuchi diffraction (TKD), focused ion beam (FIB).

The students should select a topic that would be of interest to study using SEM, the topic could preferentially be from the student's thesis work. The student should then make a literature survey as well as plan, conduct and analyze some SEM experiments. The work should be presented in a written report (like a scientific paper) and all the reports will be collected in a volume "current works in scanning electron microscopy for metallurgy and materials science". Further, a seminar will be arranged with oral presentations from all students.

Examination

- LAB1 - Hands-on SEM work, 2.0 credits, grading scale: P, F
- PRO1 - Written and oral presentation, 4.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

LAB1 - At least 6 hours hands-on SEM work.

PRO1 – Written and oral presentation of the selected SEM topic, including peer-review of one written report to be included in the volume “current account of scanning electron microscopy in metallurgy and materials science”

Other requirements for final grade

Mandatory participation at lectures and demonstration. .

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.

Additional regulations

Replaces FMH3112