

*Course syllabus*

# Mikroskopisk karaktärisering av material

## Microscopic Characterization of Materials

**KASN15, 7,5 credits, A (Second Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED B/K

**Date of Decision:** 2023-04-18

### General Information

**Elective for:** K4-m, N4-m

**Language of instruction:** The course will be given in English on demand

### Aim

- to acquire and compile knowledge on current methods of element analysis on nanometer scale
- to understand the processes behind the different methods of analysis
- to be able to execute an analysis in practice

### Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- be able to apply his/her knowledge on electron structure in order to predict properties like x-ray emission and Auger electron emission
- understand elastic and inelastic electron scattering in solid materials
- understand the principles of imaging with various methods of microscopy
- understand the working mode of different detectors

*Competences and skills*

For a passing grade the student must

- be able to plan adequate preparation methods for various types of materials

- apply his/her knowledge on choosing adequate methods for analysis of certain materials
- be able to analyse images and spectra of various types of materials, both quality and quantity
- independently execute analysis according to plan

#### *Judgement and approach*

For a passing grade the student must

- be able to evaluate accuracy and precision with the various methods of analysis
- be able to explain artefacts and sources of errors
- demonstrate the ability to plan and execute analysis of unknown materials

## Contents

- Elastic and inelastic scattering
- Magnetic lenses
- Principles and functions of different types of electron microscopes (TEM, SEM)
- Spectrometers for element analysis, Energy dispersive x-ray spectrometer (XEDS), Electron energy ions spectrometer (EELS)
- Identification and quantification of spectra.
- Biological sample preparation and imaging techniques

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** Written examination and passed analysis exercise. The results of the examination define final grade.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

## Admission

#### **Admission requirements:**

- KASF15 Materials Analysis at the Nanoscale

**The number of participants is limited to:** 12

**Selection:** Completed university credits within the programme. Priority is given to students enrolled on programmes that include the course in their curriculum.

## Reading list

- Williams, D B och Carter, B C: Transmission electron microscopy – a textbook for materials science, 2nd edition. Springer, 2009, ISBN: 978-0-387-76502-0 eller e-ISBN: 978-0-387-76501-3.
- Compendia.

## Contact and other information

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