IM2658 Experimental Techniques - Bulk 6.0 credits

Experimentella metoder - Bulk

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

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

Establishment

Course syllabus for IM2658 valid from Autumn 2008

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Physics

Language of instruction

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

Intended learning outcomes

After a successful completion of the course, students should be able to:

- Describe techniques used for the evaluation of surface properties of materials.
- Explain the underlying principle of means of detection/signal generation for surface analysis techniques.
- Name and describe techniques used for structural characterization of materials.
- Name and describe techniques used for investigation of thermal properties of materials.
- Name and describe techniques used for microstructure investigation of materials.
- Name and describe techniques used for magnetic characterization of materials.
- Name and describe techniques used for investigation of optical properties of materials.
- Name and describe techniques used for investigation of magnetic properties of materials.
- Interpret analysis results from an FT-IR spectrum.
- Interpret XRD results and relate it to homogeneity of material.
- Interpret TGA thermogram, indicating corresponding physical/chemical changes.
- Interpret DSC thermogram, indicating corresponding physical/chemical changes.
- Interpret magnetic behavior of the material from VSM measurement.

Course contents

An introduction to bulk nanostructured materials and nanocomposites will be presented. This course aims at teaching the students underlying principles of analytical techniques that are commonly used for the evaluation of bulk properties of materials. These include surface analysis technique FTIR spectroscopy; optical properties evaluation by UV-Vis spectroscopy; crystallographic phase identification by XRD; thermal properties evaluation using TGA and DSC; microstructure investigation by Electron microscopy (SEM and HRTEM); surface area analysis by BET surface area analyzer; electrical property measurement using four-probe technique; magnetic properties by VSM and mechanical properties using indenters.

Specific prerequisites

Course literature

Lecture notes and handouts.

Examination

- LAB1 - Laboratory Work, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 2.0 credits, grading scale: P, F
- TUT1 - Tutorials, 2.0 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.

Evaluation of the course will be based on two assignments, two lab exercises and a final exam. Details of grading are as follows:

2 Assignments x 1 hp: 2 hp

2 Lab Exercises x 1 hp: 2 hp

Final Exam: 2 hp

Further instructions will be given at the course start.

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.