IH2652 Methods and Instruments of Analysis 7.5 credits

Analysmetoder och analysinstrument

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 IH2652 valid from Autumn 2016

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Basic physics courses at the bachelor level, incl. optics and waves, electromagnetics and solid state physics.

Language of instruction

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

Intended learning outcomes

After completing the course the students should be able to:

- Describe the contruction and functionality of a range of advanced materials analysis methods relevant for applied materials research, especially semiconducor technology and nanotechnology.
- Chose an appropriate analysis method or combination of analysis methods to address a specific material issue.
- Correlate measurment results obtained from different methods.
- Analyse and interpret measurement results.
- Be able to suggest the need for additional complemntary analysis.
- Understand and being able to critically examine material analysis related results presented in the scientific literature or in other contexts.
- Being able to independently use some materials characterization set-ups that are available at the School of Information and Communication Technology.

Course contents

Theory and Laboration excercizes (the latter labeled with *) for the following methods:

- X-ray diffraction (XRD)*
- Scanning Probe Microscopy (SPM)*
- Ion beam-based methods (SIMS, RBS*)
- Electron microscopy (TEM, SEM*)
- Photoelectron spectroscopies (XPS, UPS, Auger, etc.)
- Electrical characterization
- Optical characterization (phtoluminescnce spectroscopy, Raman, FTIR, etc.)

Disposition

Lectures (11x2h), laborations (3x4 h), study visit (half day, Ion Technology Center, Uppsala Univeristy), written exam.

Course literature

Selected parts of the books listed below as well as articles and/or other supplements to the lectures.

- T.L. Alford, L.C. Feldman, J.W. Mayer, “Fundamentals of Nanoscale Film Analysis” Springer, 2007.

- Y. Lang, “Materials Characterization, Introduction to Microscopic and Spectroscopic Methods”, Wiley, 2008.
- Pelant and J. Valenta, “Luminescence Spectroscopy of Semiconductors”, Oxford, 2012.
- D.K. Schroder, “Semiconductor Material and Device Characterization, Third Edition”, Wiley, 2006.

Examination

- LAB1 - Laboratory Course, 2.5 credits, grading scale: P, F
- TEN1 - Examination, 5.0 credits, grading scale: A, B, C, D, E, FX, 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.

Other requirements for final grade

Approved laboration course (LAB1, 2.5 credits) as well as written exam (TEN1, 5 credits). Approval on the laboration course require active participation in all laboration exercizes as well as solved preporatory problems and a well-structured laboration report.

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.