IH2655 Design and Characterisation of Nano- and Microdevices 7.5 credits

Nano- och mikrokomponent-tillverkning och karakterisering

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 IH2655 valid from Spring 2013

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Language of instruction

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

Intended learning outcomes

The course content is an exhaustive treatment of nano- and microdevice fabrication and characterisation through theory and practical exercises. Applications in medicine, biotechnology and molecular electronics.

After the course, the student should be able to explain

- the fabrication paradigms top down and bottom up
- which process steps are needed for each method respectively
- how the main process steps work
- which physical principles are limiting for fabrication and scaling of a nano- or microdevice
- should understand environmental effects of semiconductor production and be aware of relevant energy savings and efficiency technologies.

After the lab course, the student should have

- fabricated a simple nanostructure
- characterized this structure
- measured electrical properties of a submicron semiconductor device in the research environment offered by the KTH nano and microelectronics lab in Kista, Electrum Laboratory.

Course contents

- A survey of nanotechnology and applications in medicine, biotechnology and molecular electronics.
- The fabrication paradigms: top down (starting from established microdevice fabrication) and bottom up (starting from molecules that are arrange to self-assemble).
- The important steps in the process of modern microelectronic technology.
- Characterization methods: electrical, optical, physical, chemical.
- Overview of nanophysics and simulation methods.

Course literature

Stephen A. Campbell. Fabrication Engineering at the Micro- and Nanoscale (The Oxford Series in Electrical and Computer Engineering). 4th Edition.

ISBN-13: 978-0199861224
ISBN-10: 0199861226

Examination

- LAB1 - Laboratory Work, 3.0 credits, grading scale: P, F

• TEN1 - Examination, 4.5 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

Lab course (LAB1; 3 hp). The lab course is graded P/F, but has to be done in order to schedule the oral exam. A written lab report must be handed in within one week of the lab, otherwise the maximum grade in the course is E.

One oral examination (TEN1; 4,5 hp). Oral exam is normally two students at a time and takes one hour. The grading is done immediately.

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.