



FIH3608 Nanoelectronic Device Fabrication 7.5 credits

Nanokomponenttillverkning

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

Establishment

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Enrolled as a doctoral student

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 arranged 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.

Disposition

Lectures, Lab exercises and oral examination

Course literature

Fabrication Engineering at the Micro- and Nanoscale (The Oxford Series in Electrical and Computer Engineering) Paperback – November 15, 2012

by Stephen A. Campbell (Author)

ISBN-13: 978-0199861224 ISBN-10: 0199861226 Edition: 4th

Silicon VLSI Technology: Fundamentals, Practice and Modeling, Plummer, Deal and Griffin. Upplaga: 1 Förlag: Prentice-Hall År: 2000. ISBN: 0-13-085037-3

Examination

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.

Lab course and oral examination.

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.