FIH3610 Simulation of Semiconductor Devices 7.5 credits

Simulering av halvledarkomponenter

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

Establishment

Course syllabus for FIH3610 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

A basic course in semiconductor devices or semiconductor physics and a course in electromagnetic field theory.

Language of instruction

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

Intended learning outcomes

This course gives an in-depth knowledge in simulation of device physics for advanced semiconductor devices for all application areas. The implementation of the semiconducor

equations and the solution using the finite element method and the finite volume method is explained.

After the course, the student should be able to

- analyse boundary conditions for differential equations
- analyse discretization in one and two dimensions for differential equations
- analyse semiconductor device operation
- use computer tools to solve simple problems with differential equations
- use computer tools to solve partial differential equations
- use computer tools to simulate semiconductor devices

With analyse is meant to derive relations and calculate from equations given in the textbook.

Course contents

Fundamentals of electromagnetism and its numerical analysis. Transport phenomena and their numerical analysis. Discretization in one and two dimensions. The semiconductor equations. Numerical solution of partial differential equations using the finite element method and the finite volume method. Applications to devices: p-n junction diodes, MOS-FETs, power semiconductor devices. Mixed-mode simulations. Kinetic transport models and Monte Carlo simulation.

Examination

- EXA1 - Examination, 7.5 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.

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

Homework (Simulation Labs) and an individual Project.

Other requirements for final grade

The project should be individual and connected to your research.

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.