FIH3603 Semiconductor Electrical Characterization 7.5 credits

Elektrisk karakterisering av halvledare

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

Establishment

Course syllabus for FIH3603 valid from Autumn 2012

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

PhD level only

Language of instruction

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

Intended learning outcomes

After the course the students should have an advanced working knowledge in dedicated measurement tools for semiconductor devices and low level measurements tools in general. The student should be familiar with tools for high frequency, high power (voltage/current)

and circuit evaluation.
They should be able to independently perform relevant measurements on advanced nanoelectronic devices and circuit prototypes.
The student should be able to use calibration or deembedding techniques in their experimental design and in the analysis of the measurement data.
The students should be familiar with the use of electrical characterization in yield and reliability especially with an industry perspective.
The students should be able to consider statistical limitations in their choice of characterization tools and routines.

Course contents

Low level measurements of current, voltage and impedance for nanoelectronic devices.

Circuit design basics and use of dedicated measurement tools such as source-measure units, nanovoltmeters, picoampmeters and impedance meters.

Shielding and four-point techniques including force-sense configuration, calibration and de-embedding.

Yield and reliability measurements and figure of merits.

Statistical limitations and design of experiments

Advanced measurements tools for high-frequency, high power and circuit evaluation.

Circuit evaluation basics including ESD protection and handling.

Course literature

Dieter K. Schroder, Semiconductor material and device characterization, Third Edition, Wiley-Interscience, 2006

Low Level Measurements Handbook, 6th edition, Keithley Instruments Inc, US, 2004.

Or later editions, also available online.

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.

Laboratory exercises in group, individual seminar task for oral presentation, and final individual laboratory project with written report.

Other requirements for final grade

Laboratory exercises in group, individual seminar task for oral presentation, and final individual laboratory project with written 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.