# IH1611 Semiconductor Devices 7.5 credits

## Halvledarkomponenter

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

On 15/10/2019, the Dean of the EECS school has decided to establish this official course syllabus to apply from spring term 2020 (registration number J-2019-0682).

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Electrical Engineering,Technology

## Language of instruction

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

## Intended learning outcomes

Having passed the course, the student shall be able to:

- describe the electronic band structure for insulators, semiconductors and metals qualitatively
- calculate electron and hole concentrations in semiconductors
- derive and calculate the current density in semiconductors and semiconductor components by means of the drift-diffusion model
- analyse and calculate the internal electrostatics (charges, electric field and potential) in semiconductor components based on pn and MOS-structures
- describe the function and the application areas for the pn-diode, the MOS-transistor and common types of memory cells and some kind of semiconductor sensor
- describe the basic properties for CMOS-inverters and how these are used to implement integrated circuits.

## Course contents

The general aim of the course is that you should be able to describe the function of components based on pn-junctions and MOS-structures These components include the MOS-transistor, the bipolar transistor and memory cells You should be able to explain, how the components are used in applications. You should be able to derive and calculate currents inside the components and be able to analyse the charge distribution, the electric field and the current density for given terminal voltages You should be familiar with the process flow that is used to produce modern microelectronics.

## Specific prerequisites

Analog electronics, electrostatics and modern physics.

## Examination

- LABA - Laboration, 1.5 credits, grading scale: P, F
- SEMA - Seminar, 1.5 credits, grading scale: P, F
- TENA - Written Final Exam, 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.

## 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.