

# Semiconductor Technology

Programme course

6 credits

Halvledarteknik

TFYA39

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Electrical  
Engineering, Physics and Mathematics

**Date determined**

2017-01-25

## Main field of study

Electrical Engineering, Applied Physics, Physics

## Course level

Second cycle

## Advancement level

A1X

## Course offered for

- Physics and Nanoscience, Master's Programme
- Physics and Nanotechnology
- Computer Science and Engineering, M Sc in Engineering
- Information Technology, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Electronics Engineering, Master's programme
- Materials Science and Nanotechnology, Master's programme

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

Modern Physics

## Intended learning outcomes

The aim of this course is to make the student aware of the fundamental physical principles of semiconductor devices, and how modeling of devices is done. The participants of the course obtain the basic understanding, which is required for working with integrated circuits and optoelectronics. This implies that the student should:

- be familiar with fundamental physical principles which govern performance of semiconductor devices
- be able to use basic equations describing device performance
- understand and be able to explain in a well structured and logical concise way characteristics, operation and limitations of semiconductor devices
- understand and be able to explain main technological approaches for device fabrication
- develop basic tools with which they can later apply for learning newly developed devices and applications

## Course content

Basic semiconductor physics. Operation and modeling of pn-junctions, optoelectronic devices, bipolar transistors, field-effect transistors, and integrated circuits. An overview of processing of semiconductor devices and integrated circuits is given. Introduction into modern semiconductor technologies, such as nanotechnology and spin electronics.

## Teaching and working methods

Lectures, seminars and laboratory exercises.

## Examination

|      |                               |           |            |
|------|-------------------------------|-----------|------------|
| UPG1 | Homework and Oral Examination | 5 credits | U, 3, 4, 5 |
| LAB1 | Laboratory Work               | 1 credits | U, G       |

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Department

Institutionen för fysik, kemi och biologi

## Director of Studies or equivalent

Magnus Johansson

## Examiner

Irina Buyanova

## Course website and other links

<http://www.ifm.liu.se/undergrad/fysikgtu/coursepage.html?selection=all&sort=kk>

## Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

## Course literature

### Additional literature

#### Books

Ben G. Streetman och Sanjay Banerjee, (2000) *Solid State Electronic Devices* 5:e upplagan Prentice-Hall International Editions

ISBN: ISBN 0-13-025538-6

Main textbook (aligned to lecture notes) (or 6th edition, ISBN 0-13-149726-X)

D.A. Neamen, (2003) *Semiconductor Physics and Devices* McGraw-Hill

ISBN: ISBN 0-07-119862-8

As substitute for the main textbook

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).