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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.