



# SK2754 Advanced Semiconductor Materials 7.5 credits

Avancerade halvledarmaterial

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

## Establishment

Course syllabus for SK2754 valid from Autumn 2017

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Engineering Physics

## Specific prerequisites

Bachelor's degree in physics, electrical engineering or equivalent degree. Knowledge in solid state physics

## Language of instruction

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

# Intended learning outcomes

The aim of the course is to give

1. knowledge on the direct and indirect bandgap semiconductors, their transport and optical properties,
2. an understanding of various bulk and epitaxial techniques used to fabricate the compound semiconductors,
3. usefulness of doping and exploitation of compound semiconductor heterostructures for several optical and electrical components,
4. introduction to organic semiconductors.

After the course, the student should be able to use the properties of compound semiconductors for fabricating high performance electronic and optical component structures. One should be able to propose the necessary processes for fabricating these components and relate their performance to the component structure. One should also be able to understand how an organic semiconductor functions.

## Course contents

Elemental and compound semiconductors, differences in their bandstructures, crystal structure, electrical and optical properties, shallow and deep level dopants, bulk and epitaxial crystal growth techniques, heterostructures, quantum wells, quantum wires, quantum dots, bandgap engineering, optical and electronic components, process technology for fabricating these components, organic semiconductors..

## Course literature

Semiconductor Devices, Jasprit Singh. Upplaga: Förlag: John Wiley & Sons År:2001 ISBN: 0-471-36245-X

## Examination

- **TEN1** - Examination, 7.5 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.

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

The exam consists of two parts. Part 1 is knowledge test and part 2 is lab course. To gain Fx and higher, one must pass both the parts. There are four lab courses, namely, MOVPE, X-ray diffraction, photoluminescence and Hall measurements. A lab report on each of the

lab courses should be written. An approved lab report is a must to have the grade A-Fx. The association of grade with the percentage of marks is as follows: F:

## **Other requirements for final grade**

Passed grade in all the parts.

## **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.