



LUND
UNIVERSITY

Faculty of Science

FYST71, Physics: Crystal Growth and Semiconductor Epitaxy, 7.5 credits

Fysik: Kristalltillväxt och halvledarepitaxi, 7,5 högskolepoäng
Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2022-06-13 to be valid from 2022-06-13, spring semester 2023.

General Information

The course is an elective course for second-cycle studies for a Bachelor's or Master's degree (120 credits) in physics.

Language of instruction: English

Main field of studies

Physics

Depth of study relative to the degree requirements

A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that the student, once the course is completed, has acquired knowledge to understand crystal growth and especially semiconductor epitaxy.

Knowledge and understanding

On completion of the course, the student should be able to:

- explain crystal growth and epitaxy and the relevant concepts within thermodynamics and kinetics.
- explain the connection between growth parameters and growth method and the properties and quality of the result.

Competence and skills

On completion of the course, the student should be able to:

- evaluate and choose an appropriate crystal growth method for a specific issue.
- orally and in writing present issues concerning crystal growth in a scientific way.

Judgement and approach

On completion of the course, the student should be able to:

- reflect on the role of epitaxy in society.
- discuss how crystal growth and epitaxy can contribute to a more sustainable society.

Course content

This course treats the fundamental aspects of crystal growth, e.g. the thermodynamic prerequisites for crystal growth such as chemical potential, construction of binary phase diagrams, supersaturation, and nucleation. Further on, surface energies, surface diffusion, and Wulff's theorem are studied. In the course section on epitaxial growth surface reconstructions, lattice mismatch, and dislocations, as well as characterization – both in- and ex-situ are discussed. Growth techniques and reactor models are also dealt with. During the course, the various moments will be illuminated by examples from modern research, especially research on epitaxy of nanostructures.

Course design

The teaching consists of lectures and problem solving classes.

Assessment

Assessment takes the form of a written exam at the end of the course. Students who do not pass the regular exam are offered a new possibility during scheduled reexamination period.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

To pass the entire course an approved written exam is required. The final grade is decided through the written examination.

Entry requirements

Admission to the course requires 120 credits in natural science studies, of which 75 credits in physics and 45 credits in mathematics is included, alternatively a Bachelor degree in physics – in both cases including knowledge equivalent to FYSC23 Solid

State Physics, 7.5 credits, and FYSD23 Processing and Device Technology, 7.5 credits, and English 6/B.

Further information

The course replaces FYST35 Physics: Crystal Growth and Semiconductor Epitaxy, 7.5 credits, and cannot be counted in a degree together with this course.

The course is entirely co-read with FAFN15, Crystal Growth and Semiconductor Epitaxy, 7.5 credits, which is a course at the Faculty of engineering, LTH. The examination of the course is scheduled in accordance with LTH's examination schedule.

The course is given by the Department of Physics, Lund University.

Subcourses in FYST71, Physics: Crystal Growth and Semiconductor Epitaxy

Applies from V23

2301 Written exam, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction