



LUND
UNIVERSITY

Faculty of Science

FYST81, Physics: Nanomaterials - Thermodynamics and Kinetics, 7.5 credits
Fysik: Nanomaterial - termodynamik och kinetik, 7,5 högskolepoäng
Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2022-12-12 to be valid from 2022-12-12, autumn semester 2023.

General Information

The course is an elective course for second cycle studies for a scientific candidate - 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 course objective is that the student, on completion of the course, shall be well familiar with thermodynamic phenomena and kinetic processes important for material science and that can be used in nanomaterials.

Knowledge and understanding

On completion of the course, the students shall be able to:

- give an account of basic thermodynamic concepts
- explain the equilibrium concept for nanomaterials
- explain phase diagrams
- describe reaction processes in systems with several components
- explain fundamental mass and heat transport equations.

Competence and skills

On completion of the course, the students shall be able to:

- use thermodynamic equations for materials science problems
- discuss and solve chemical reaction problems
- define and solve diffusion problems.

Judgement and approach

On completion of the course, the students shall be able to:

- interpret binary and ternary phase diagrams
- reflect on how thermodynamics and kinetics can be applied to nanomaterials.

Course content

The course provides specialized knowledge in:

- Fundamental thermodynamics and heat engines
- Thermodynamic equilibrium
- Phase equilibria, phase stability and phase transitions
- Phase diagrams (single component - multi component)
- Reactions and reaction kinetics
- Mass transfer - diffusion in solid phase, diffusion in liquids
- Heat transport
- Size effects.

Course design

The teaching consists of lectures, exercise sessions and hand-in assignments.

Assessment

Examination takes place in the form of a written examination at the end of the course.

Students who do not pass a regular assessment will be offered another opportunity for assessment soon thereafter.

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.

For a Pass grade on the whole course, the student must have Pass grade in written exam. The final grade is decided by the grade on the exam.

Entry requirements

Admission to the course requires 90 credits in scientific studies, or a bachelor's degree in physics, chemistry or equivalent - in both cases including a course that contains at least 2.5 credits thermodynamics. Furthermore is required English 6/B and general entry requirements.

Further information

This course replaces FYST40, Physics: Nanomaterials - Thermodynamics and Kinetics, 7.5 credits and cannot be included in degree together with this course.

The course is in full coordinated with FFFN05, Nanomaterials - Thermodynamics and Kinetics, 7.5 credits that are a course at Lund's institute of technology LTH.

The examination of the course is scheduled in accordance with the LTH exam schedule.

The course is offered at the Department of Physics, Lund University.

Subcourses in FYST81, Physics: Nanomaterials - Thermodynamics and Kinetics

Applies from H23

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