Faculty of Science

FYST96, Physics: Optoelectronics and Optical Communication, 7.5 credits

Fysik: Optoelektronik och optisk kommunikation, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by The Education Board of Faculty of Science on 2024-11-28. The syllabus comes into effect 2024-11-28 and is valid from the spring semester 2026.

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 study	*Specialisation*
Physics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The course will provide a platform both for the selection of suitable devices for various applications in optoelectronics and optical communication and for the development of next generation devices. To achieve this, the course will emphasise the underlying physics as well as how performance is affected by device design and materials properties.

Knowledge and understanding

To pass the course, the student should be able to

- explain how light and electrons interact in semiconductors
- explain concepts such as energy quantisation and microcavities
- explain design and the resulting function of various types of light-emitting diodes, diode lasers, detectors and camera chips

- explain how light propagates in waveguides and optical fibres
- explain the principles of fibre optical components for optical communication.

Competence and skills

To pass the course, the student should be able to

- select and motivate appropriate light sources, light guiding systems and detectors for various optoelectronic applications
- calculate the performance of optical detectors and fibre optical components
- assimilate and integrate knowledge from scientific literature in the field.

Judgement and approach

To pass the course, the student should be able to

- independantly assess when and how the methods covered in the course can be applied.

Course content

- Optical processes in semiconductors, materials properties, charge carrier dynamics
- Wave guide optics, fibre optics and optical communication
- Quantum structures and microcavities
- Light emitting devices: light-emitting diodes and laser diodes.
- Light-absorbing devices: detectors and camera chips.

Course design

The teaching consists of lectures, laboratory sessions and exercises Participation in laboratory sessions and associated teaching, is mandatory.

Assessment

Assesment takes the form of written laboratory reports during the course and a written examination at the end of the course.

Students who do not pass the regular exam are offered a new possibility at scheduled retake 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.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction
To pass the course, approved examination and approved laboratory reports and participation in all compulsory parts are required.

The grading scale for the laboratory exercises is Fail, Pass and the grading scale for the written examination is Fail, Pass, Pass with distinction.

The final grade is determined by the written examination.

Entry requirements

For admission to the course, knowledge is required equivalent to 90 credits in natural sciences, including knowledge equivalent to FYSC23 Solid State Physics, 7.5 credits and English 6/B.

Further information

The course replaces FYST50, Optoelektronics och Optical Communication, 7,5 credits and credits from that course cannot count towards a degree together with this course.

The course is co-organized together with FYST50, Optoelektronics och Optical Communication, 7,5 credits, which is a course at Lund University's Engineering Faculty, LTH.

The examination is scheduled according to the LTH exam schedule.

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