

Course syllabus

Optoelektronik och optisk kommunikation

Optoelectronics and Optical Communication

FFFN25, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED N

Date of Decision: 2023-04-17

General Information

Main field: Photonics.

Main field: Nanoscience.

Compulsory for: MFOT1

Elective for: E4-fh, F4, F4-f, F4-nf, F4-fel, MNAV1, N4-nf, N4-hn

Language of instruction: The course will be given in English

Aim

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. In order to achieve this, the course will emphasize the underlying physics as well as how performance is affected by device design and materials properties.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to explain how light and electrons interact in semiconductors
- be able to explain concepts such as energy quantization and microcavities
- be able to explain the design and the resulting function of different types of LEDs, diode lasers, detectors and camera sensors
- be able to explain how light propagates in wave guides and optical fibres

- be able to explain the principles of fiber optical components for optical communication.

Competences and skills

For a passing grade the student must

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

Contents

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

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written examination and completed laboratory work.

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.

Parts

Code: 0115. **Name:** Written Examination.

Credits: 6,5. **Grading scale:** TH. **Assessment:** Written exam

Code: 0215. **Name:** Laboratory Exercises.

Credits: 1. **Grading scale:** UG. **Assessment:** Written reports.

Admission

Assumed prior knowledge: Basic semiconductor physics equivalent to Solid State Physics (FFFF05), Electronic Materials (FFFF01) or Physics of Devices (ESSF20).

The number of participants is limited to: No

The course overlaps following course/s: FFFN15, FAF095

Reading list

- B. E. A. Saleh and M. C. Teich : Fundamentals of Photonics, 2nd ed. Wiley-Interscience, 2007, ISBN: 978-0-471-35832-9.
- Lecture notes and scientific articles.

Contact and other information

Course coordinator: Dan Hessman, dan.hessman@ftf.lth.se

Course homepage: <https://canvas.education.lu.se>