Micro- and Nanophotonics, 6.0 credits

Micro- and Nanophotonics, 6.0 hp

Third-cycle education course

6FIFM62

Department of Physics, Chemistry and Biology

Valid from: Second half-year 2024

Approved by **Approved**

Registration number

Entry requirements

Entry requirement for studies on third-cycle education courses:

- second-cycle degree,
- 240 credits in required courses, including at least 60 second-cycle credits, or
- acquisition of equivalent knowledge in some other manner

Specific entry requirements for this course:
Bachelor level mathematics and physics. It is in particular recommended to have a good knowledge in electromagnetics, wave physics and optics.

Learning outcomes

The aim of the course is to give in-depth knowledge of optics.
By the end of the course the students will be able to:

- understand interaction of light with matter at the micro and nano scale,
- simulate lite interaction with complex structured media,
- understand the operating principle of basic micro- and nano-optical elements and be able to design them

Contents

The course contains an exposition of the advanced concepts of optics and photonics. The course deals with

- Specifics of light interaction with matter, size effects, ordered and disordered structures
- Optical simulations and measurements of micro- and nano-structures
- Gradient index optics
- Diffractive optical elements
- Photonic crystals
- Tunable optical components and their applications (spatial light modulators, optical tweezers, ect.)
- Plasmonics and metamaterials

Educational methods

Active learning is primarily used when students learn the material on their own. Classes are a mixture of seminars and lectures.

Examination

Examination contains solution of the home assignments and oral presentations.

Grading

Two-grade scale

Course literature

Bahaa E. A. Saleh, Malvin Carl Teich, Fundamentals of Photonics, Wiley Interscience; 2nd edition (2007).
Springer Handbook of Lasers and Optics, edited by F. Träger Springer-Verlag Berlin and Heidelberg GmbH & Co. K (2012).

General information

The course is planned and carried out according to what is stated in this syllabus. Course evaluation, analysis and suggestions for improvement should be fed back to the Research and PhD studies Committee (FUN) by the course coordinator.