SK2402 Fundamentals of Photonics 7.5 credits

Fotonikens grundprinciper

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SK2402 valid from Autumn 2019

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

At least 120 credits in engineering and natural sciences and knowledge of English B or equivalent.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completing the course, the student should be able to

- explain the physical principles underlying the generation, transmission, manipulation and detection of light.
- choose, derive and apply suitable models to predict and analyze the response of basic photonic components such as optical waveguides, resonators, modulators, frequency converters and switches, optical sources and detectors.
- identify and critically discuss the limits of validity and applicability of the different models.
- perform basic measurements through hands-on work in a photonic lab.
- analyze and present data acquired using lab instruments and generated by simulations.
- be able to solve with the necessary literature practical and theoretical problems within the field of photonics.

Course contents

The course covers the physical principles underlying the operation of basic photonic components such as lasers, modulators, optical fibers and detectors and involving the generation, transmission, manipulation and detection of light.

Specifically, the course covers the following topics:

- Electromagnetic optics
- Beam optics
- Guided-wave optics
- Coupled mode theory
- Optics of periodic systems
- Resonator optics
- Acousto-optics
- Electro-optics
- Nonlinear optics
- Ultrafast optics
- Generation and detection of light

Course literature

B. E. A. Saleh and M. C. Teich, “Fundamentals of Photonics”, Wiley series in Pure and Applied Optics, J. Wiley & Sons Publ. Information about the edition and any additional literature will be announced in the course PM.

Examination

- INL1 - Assignments, 2.5 credits, grading scale: P, F
- LAB1 - Laboratory work, 1.0 credits, grading scale: P, F
- TEN1 - Examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The examiner, in consultation with the KTH Disability Coordinator (Funka), decides on any adapted examination for students with documented permanent impairment. The examiner may grant another examination form for reexamination of single students.

Other requirements for final grade

The course is examined by written exam (TEN1; 4 credits, grade scale A / B / C / D / E / Fx / F), as well as approved assignments (INL1; 2.5 credits, grade scale P / F) and laboratory work (LAB1; 1, 0 credits, grade scale P / F). The rating on TEN1 determines the grade on the course.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.