



# FIO3002 Optics 9.0 credits

## Optik

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

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

## Establishment

Course syllabus for FIO3002 valid from Autumn 2010

## Grading scale

## Education cycle

Third cycle

## Specific prerequisites

## Language of instruction

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

## Intended learning outcomes

After successful completing the course, the students should be able to:

- Understand basics of the electromagnetic and scalar representation of optical fields
- Identify the limitations of geometrical, scalar, and vector description of phenomena
- Have clear understanding of the wave concept of optical fields, dispersion properties, and difference between the phase and group velocity of the light

- Understand Fresnel and Fraunhofer diffraction as sequential approximations of the rigorous representation of the Huygens-Fresnel integral
- Analyze polarization effects and operation of devices modifying the light polarization
- Understand main concepts of linear imaging systems, including the difference between coherent and incoherent systems
- Realize main operations and functions of the image processing using spatial filtering of the Fourier-components

In addition to the labs and exam (compulsory parts for advanced course in Optics), PhD students should complete personal assignments (2 credit points) possibly related to the topics of their research.

## Course contents

Electromagnetic radiation, wave equations, propagation in vacuum and matter. Diffraction, interference, polarization. Coherent and incoherent light sources. Geometrical optics and image formation, optical analysis and design, image quality. Transfer of energy and information, radiometry and photometry.

## Disposition

Laboratory - LAB1; 2 credits

Personal assignments - ANN1; 2 credits

Written examination - TEN1; 5 credits

## Course literature

Textbooks:

E. Hecht, Optics, Addison Wesley; 4 edition (2001), ISBN-10: 0805385665.

F.L. Pedrotti, L.M. Pedrotti, L.S. Pedrotti, Introduction to Optics, 3rd edition (2007),

ISBN-10: 0131499335.

## Examination

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.

## 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.