



# IO2662 Fundamentals of Fourier-Optics 7.5 credits

Fourier-Optikens grunder

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

## Establishment

Course syllabus for IO2662 valid from Spring 2011

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Engineering Physics

## Specific prerequisites

The same prerequisites as for the Master's Programme in Photonics or Nanotechnology

## 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 scalar diffraction theory
- Understand Fresnel and Fraunhofer diffraction as sequential approximations of the rigorous representation of the Huygens-Fresnel integral
- Identify the spatial Fourier spectrum of an arbitrary optical field at the image plane
- Understand main concepts of linear imaging systems, including the difference between coherent and incoherent systems
- Describe and analyze optical imaging system (device) in terms of the optical transfer function and spatial frequency response
- Analyze the imaging performance of optical systems
- Design and optimize a simple optical system using resolution and aberration criteria
- Realize main operations and functions of the image processing using spatial filtering of the Fourier-components

## Course contents

The course content covers basic principles of the operation and design of optical systems (devices) using the concept of optical information processing and application of Fourier-analysis in optics.

## Disposition

The lectures will be given in local premises of the department, thus no booking of lecture halls is required.

## Course literature

Textbook: J.W. Goodman, Introduction to Fourier Optics, 2nd edition, McGraw-Hill, 1998, ISBN 0-07-024254-2.

## Equipment

Not specified

## Examination

- ANN1 - Home Assignments, 3.0 credits, grading scale: P, F
- TEN1 - Written Examination, 4.5 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 final examination requires solving the set of problems. Grading is given in A-F scale. Detailed criteria are explained on lectures.

## Other requirements for final grade

Final grade is based on the successful completing of the home assignments and solving examination problems.

## 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.