



LUND
UNIVERSITY

Faculty of Science

FYST32, Physics: Advanced Optics and Lasers, 7.5 credits

Fysik: Avancerade laser- och optiksystem, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2009-10-07 to be valid from 2009-10-07, spring semester 2010.

General Information

The course is an elective course for second-cycle studies for a scientific candidate - or Master's degree in physics.

Language of instruction: English

Main field of studies

Physics

Depth of study relative to the degree requirements

A1F, Second cycle, has second-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that students should have acquired the following knowledge and skills on completion of the course:

Knowledge and understanding

On completion of the course, the student should be able to:

- account for the principles of acoustooptic and electrooptic effects and how they can be used to modify the propagation of laser pulses
- describe the basic principles of non-linear interactions between light and matter
- carry out theoretical calculations of the efficiency for non-linear processes.

Skills and abilities

On completion of the course, the student should be able to:

- qualitatively and quantitatively analyse advanced optical systems based on acoustooptical, electrooptical and non-linear optical effects
- design optical systems based on acoustooptical, electrooptical and non-linear optical effects for specific tasks
- calculate pulse shapes after propagation
- tackle and solve more extensive and complex theoretical problems
- search for and integrate knowledge from extensive English reading lists.

Judgement and approach

On completion of the course, the student should:

- be able to better assess and find optical methods to develop new technological applications, methods and systems.

Course content

- Light propagation in anisotropic materials
- Acoustooptical effects and modulators
- Electrooptical effects and modulators
- Not linear interaction between light and matter
- Ultrafast optics, propagation of short laser pulses in dispersive non-linear media

Two laboratory sessions: Non-Linear Optics, Ultrafast optics (TiS laser)

Demonstrations: Study visit and current research information may be included. A project in optical design by means of a modern ray tracing program.

Course design

The teaching consists of lectures, 2 laboratory sessions, group work and projects. Participation in laboratory sessions, projects and related teaching is compulsory.

Assessment

Written examination at the end of the course. Students who do not pass the regular exam are offered a new possibility shortly after the regular exam.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

To pass the entire course, approved examination, approved laboratory reports and project report and participation in all compulsory parts are required.

The final grade is decided by the results of the written examination.

Entry requirements

For admission to the course, 90 credits natural sciences are required in which knowledge equivalent to FYSA31 Physics 3, Modern physics, 30 credits should be included and English B.

Further information

The course is the fourth in a series of four courses within photonics that uses the same book.

Subcourses in FYST32, Physics: Advanced Optics and Lasers

Applies from H16

- 0911 Exam, 4,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 0912 Project, 1,0 hp
Grading scale: Fail, Pass
- 0913 Laboratory Exercises, 2,0 hp
Grading scale: Fail, Pass

Applies from V10

- 0901 Advanced Optics and Lasers, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction