



LUNDS UNIVERSITET  
Lunds Tekniska Högskola

*Course syllabus*

## Våglära och optik Waves and Optics

**FAFF40, 7,5 credits, G2 (First Cycle)**

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED N

Date of Decision: 2023-04-17

### General Information

Main field: Technology.

Compulsory for: F1, Pi1

Language of instruction: The course will be given in Swedish

### Aim

The course aims at developing the physics problem solving skills of the student. The course gives the students training in discussing physics, improves their experimental skills and introduces computer aided data analysis and graphical data representation. It treats wave propagation with particular emphasis on electromagnetic waves and optics. Electromagnetic radiation and wave propagation are central concepts in modern technology, but also connects directly to the wave function description of the quantum world. This course provides a foundation for understanding and developing the technology around us, and modern physics.

### Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- know the basic physical principles of wave propagation,
- be able to relate abstract mathematical models and analogies to experiments and the reality,
- know how to analyze basic problems and calculations on waves and wave propagation.

*Competences and skills*

For a passing grade the student must

- have improved his/her ability to carry out laboratory work and analyze the results using computers,
- have improved his/her ability to present calculations and observations in written form,
- be able to solve simple physics problems in a structured way.

### *Judgement and approach*

For a passing grade the student must

- be able to demonstrate an understanding of scientific methods and to realize possibilities and limitations of physics,
- be able to evaluate results of different experimental methods,
- be able to identify his/her further need of knowledge also within other areas.

## Contents

Light sources, waves and wave propagation with emphasis on light waves. Central aspects of the course are electromagnetic waves, interference, Fermat's Principle, Huygens' Principle, imaging with lenses and mirrors (computer aided ray tracing) and diffraction (both Fraunhofer and Fresnel), polarization, coherence and introduction to lasers. Emphasis is placed on conceptual understanding and how the course's various parts relate to each other and to modern technology and research. The laboratory work is used to visualize important concepts in physics.

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** Written exam, written assignments and passed laboratory sessions.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

### Parts

**Code:** 0116. **Name:** Waves and Optics.

**Credits:** 5. **Grading scale:** TH. **Assessment:** Written exam.

**Code:** 0216. **Name:** Laboratory Sessions.

**Credits:** 2,5. **Grading scale:** UG. **Assessment:** Passed laboratory sessions and written assignments.

## Admission

**Assumed prior knowledge:** FMAB30 Calculus in Several Variables

**The number of participants is limited to:** No

**The course overlaps following course/s:** FAFA25, FAFA01, FAFA05, FAFA50, FAFF25, FAFF30, FAFA60, FAFA65, FAF260

## Reading list

- Jönsson, G.: Våglära och optik. ISBN: 9789163943492.

## Contact and other information

**Course coordinator:** Johan Mauritsson, johan.mauritsson@fysik.lth.se

**Course homepage:** <https://canvas.education.lu.se/courses/15113>

**Further information:** The written exam will be digital. Some elements may be taught and assessed in English. This includes a maximum of 1.5 hp, in the form of laboratory sessions or written assignments.