



SK2902 Light-matter Interaction 7.5 credits

Växelverkan ljus-materia

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

Establishment

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 and apply the physical theory of light-matter interaction for evaluation of emission, manipulation and absorption of light in atoms, molecules and solids.
- identify and discuss applications of light-matter interaction in photon technologies such as spectroscopy or design of photonic materials and components.
- acquire, analyze and present experimental data, while observing general rules of conduct and safety in the laboratory environment.

Course contents

The main course content is the interaction of light with atoms, molecules and solids to generate, manipulate and detect light using optical components. The course covers the basics, for future studies on applications such as light sources, sensors or solar cells. Specifically, the content is

- How physical processes in a material shape its optical properties such as absorption or refractive index.
- How optical transitions in atoms and molecules generate, manipulate and absorb light.
- How band structures and optical transitions in crystals generate, manipulate and absorb light.
- How light interaction with electrons and phonons create plasmons, excitons and polaritons.
- How light interacts with quantum structures such as quantum wells or quantum dots.

Course literature

Fox, M, "Optical Properties of Solids", Oxford University Press. Information about the edition and additional literature are announced in the course PM.

Examination

- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory work, 1.5 credits, grading scale: P, 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; 6 credits, grade scale A / B / C / D / E / Fx / F), as well as approved laboratory work (LAB1; 1.5 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.