



# SI1151 Quantum Physics 6.0 credits

## Kvantfysik

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 SI1151 valid from Autumn 2015

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Technology

## Language of instruction

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

## Intended learning outcomes

After finished course the student should be able to:

- Describe the scientific basis for quantum physics.
- Apply quantum mechanical formalism to physical problems.
- Have a good insight into important application of quantum physics.

## Course contents

The basis of quantum mechanics and its postulates. The solution of the Schrödinger equation with simple potentials using analytical and numerical methods. The harmonic oscillator. The bracket notation of Dirac. Operator formalism and commutators. Angular momentum and spin. Matrix representation of quantum mechanics. The Pauli principle. Addition of angular momentum. None-degenerate and degenerate time independent perturbation treatment with applications. Coupling of spin and angular momentum. The Zeeman effect. Hyperfine structure. Introduction to time dependent perturbation calculations and the Fermi golden rule. Charged particles in electromagnetic fields. Introduction to scattering theory and the Born approximation. The hydrogen and helium atoms. Simple molecules.

## Specific prerequisites

Recommended prerequisites: Physics corresponding to modern physics (SH1009), mathematical methods of physics (SI1140).

## Course literature

D.J. Griffiths, Introduction to Quantum Mechanics, 2nd ed., Pearson (2005).

## Examination

- LAB1 - Laboration, 1.0 credits, grading scale: P, F
- TEN1 - Written Examination, 5.0 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.

## Other requirements for final grade

Written examination (TEN1, 5 university credits) and laboration (LAB1, 1 hp)

## 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.