

SYLLABUS

Quantum Physics 7.5 credits F0047T

Kvantfysik

Course syllabus admitted: Autumn 2023 Sp 1 - Present

**DECISION DATE
2021-02-17**

Quantum Physics 7.5 credits F0047T

Kvantfysik

First cycle, F0047T

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Fysik	Physics

Main field of study

Engineering Physics and Electrical Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and Basic course in Modern physics, mechanics (oscillatory and angular momentum in three dimensions), linear algebra, analysis and ordinary and partial differential equations (separable) and being able to write simple computer program in matlab or c. Courses that provide this are: D0009E, F0008T, F0007T, M0032M, M0018M, M0014M.

Selection

The selection is based on 1-165 credits.

Course Aim

After the course, the student should be able to understand and apply:

- The motivation for quantum mechanics in modern physics.
- The foundations of quantum mechanics.
- Wave-particle dualism, wave packet, probability interpretation, Heisenberg uncertainty relations.
- Operators, eigenvalues and expectation values.
- Understand and calculate properties of quantum mechanical systems and processes.
- Angular momentum and central motion.
- Hydrogen atom and spin.
- Perturbation calculations.
- Spectra of atoms and molecules.

Contents

Foundations of quantum mechanics, Schrödinger equation, state, operators, eigenvalues, well potential, harmonic oscillator, Hydrogen atom, angular momentum, spin and tunneling, perturbation calculations. The lab exercises consist of three parts: Franck-Hertz experiment, analysis of atomic spectra and perturbation calculation on a computer using matlab.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Teaching will be performed as ordinary lectures and solution of problems. Laboratory exercises and a written report are compulsory.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Written exam at the end of the course. Written labb reports.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Remarks

Course cannot be combined with F0018T.

Overlap

The course F0047T is equal to MTF107

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	1	Mandatory	A09	
0003	Written exam	G U 3 4 5	6.5	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Head Faculty Programme Director Niklas Lehto 2021-02-17

Syllabus established

The syllabus was accepted by the Department of Applied Physics and Mechanical Engineering 2008-12-15 and remains valid from autumn term 2009..