



LUND
UNIVERSITY

Faculty of Science

FYST37, Physics: Advanced Quantum Mechanics, 7.5 credits *Fysik: Avancerad kvantmekanik, 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 Bachelor's 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 upon completion of the course:

Knowledge and understanding

- advanced knowledge in quantum mechanics, in particular regarding the treatment of angular momentum, symmetries, identical particles and dispersion problems.
- proficiency to independently solve quantum mechanical problems

Course content

Description of the subject-related contents of the course:

- Momentum, translations and time development, the Heisenberg formalism, propagators, potentials and gauge transformations.
- Angular momentum and rotation, commutator relations and Euler rotations,

representations of the rotation operator, rotation matrices, addition of angular momentum, Bell's difference, tensor operators, the Wigner-Eckart theorem.

- Symmetries: parity, periodic potentials, time reflection.
- Perturbation theory: The Interaction model, time-dependent perturbation, Fermi's golden rule.
- Many-particle theory and second quantisation: Identical particles, bosons and fermions, field operators.
- Scattering theory: The Lippman-Schwinger equation, the Born approximation, the optical theorem, partial waves, resonance scattering, time-dependent formalism.

Course design

The teaching consists of lectures and seminars.

Assessment

Examination takes place in the form of a written examination at the end of the course. Students who do not pass a regular assessment will be offered another opportunity for assessment soon thereafter.

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, a passed examination is required

The final grade is decided by the written examination.

Entry requirements

For admission to the course, 90 credits of science is required including knowledge equivalent to FYSN17 Physics: Quantum Mechanics 7,5 ects, and English B.

Subcourses in FYST37, Physics: Advanced Quantum Mechanics

Applies from V09

0901 Advanced Quantum Mechanics, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction