



Faculty of Technology and Science
Physics

Syllabus

Course Approval

The syllabus was approved by the Faculty Board of Technology and Science on 20 April 2010, and is valid from the Autumn semester of 2007 at Karlstad University.

Course Code: FYAD04

Advanced Quantum Mechanics, 7.5 ECTS Credits
(Avancerad kvantmekanik, 7.5 Swedish credit points)

Degree Level: Master

Progressive Specialisation: A1F (Second cycle, has second-cycle course/s as entry requirements)

Language of Instruction

English or Swedish

Prerequisites

Mathematics 45 ECTS cr., Physics 90 ECTS cr., including the course Quantum Physics I, or equivalent.

Major Field of Study

FYA (Physics)

Learning Outcomes

The aim of the course is that students acquire in-depth knowledge and skills in modern quantum mechanics. The ability to apply this theory is central to the understanding of the complex properties of matter in physics, chemistry and modern biology. The focus is on non-relativistic quantum mechanics with an emphasis on developing the practical knowledge of the theory needed for applications and for further advanced studies.

Upon completion of the course, students should be able to:

- give an in-depth account of the quantum-mechanical theory for each main course component listed below,
- use the quantum-mechanical theory for each main course component to solve problems and for applications.

Content and Form of Instruction

The main course components are:

- Fundamental concepts and ideas of quantum mechanics, including bra-ket formalism, operators, matrix representation, change of basis, measurements, observables, the uncertainty relation, position and momentum space, translation
- Quantum dynamics
- Theory of angular momentum
- Symmetry in quantum mechanics
- Approximation methods
- Identical particles
- Scattering theory

Reading List

See separate document.

Examination

Assessment is based on continuous assessment of seminar presentations, hand-in assignments, and on a final oral exam.

Grades

One of the grades Fail, 3 (Pass), 4 (Some Distinction), or 5 (Distinction) is awarded to engineering program students in the examination of the course. One of the grades U (Fail), G (Pass) and VG (Distinction) is awarded to other students in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course assessment is based on student views and experiences as reported in written course evaluations and/or group discussions. Students will be informed of the result of the evaluation and of the measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional Information

Students who enrolled before 1 July 2007 will complete their studies in accordance with the requirements of the earlier admission. Upon completion students may request degree and course certificates to be issued under the current ordinance if they meet its requirements.

The local regulations for studies at the Bachelor's and Master's levels at Karlstad University stipulate the obligations and rights of students and staff.

The course is part of the Master's programmes Nanomaterials and Theoretical Physics.

Karlstads universitet 651 88 Karlstad, Sweden
Tel +46-54-700 10 00 Fax +46-54-700 14 60
information@kau.se www.kau.se