Module: Elective Courses Theoretical Physics

Module No.: ECThPhysics

Course: Advanced Quantum Theory

Course No.: physics606

Category	Type	Language	Teaching hours	CP	Semester
Required	Lecture with exercises	English	3+2	7	WT

Requirements for Participation:

Preparation:
Theoretical courses at the Bachelor degree level

Form of Testing and Examination:
Requirements for the module examination (written examination): successful work with exercises

Length of Course:
1 semester

Aims of the Course:
Ability to solve problems in relativistic quantum mechanics, scattering theory and many-particle theory

Contents of the Course:
Born approximation, partial waves, resonances
advanced scattering theory: S-matrix, Lippman-Schwinger equation
relativistic wave equations: Klein-Gordon equation, Dirac equation
representations of the Lorentz group
many body theory
second quantization
basics of quantum field theory
path integral formalism
Greens functions, propagator theory

Recommended Literature:
L. D. Landau, E.M. Lifschitz; Course of Theoretical Physics Vol.3 Quantum Mechanics (Butterworth-Heinemann 1997)
J. J. Sakurai, Modern Quantum Mechanics (Addison-Wesley 1995)
F. Schwabl, Advanced Quantum Mechanics. (Springer, Heidelberg 3rd Ed. 2005)