

Module: Base Module Theoretical Physics

Module No.: physics605

Course:  **Advanced Quantum Theory**

Course No.: physics606

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

Requirements:**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)