

<b>Module:</b>	<b>Elective Courses Theoretical Physics</b>
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<b>Module No.:</b> ECThPhysics
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<b>Course:</b>	 <b>Advanced Quantum Theory</b>
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<b>Course No.:</b> physics606
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Category	Type	Language	Teaching hours	CP	Semester
Required	Lecture with exercises	English	3+2	7	WT

<b>Requirements for Participation:</b>
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<b>Preparation:</b>
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Theoretical courses at the Bachelor degree level
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<b>Form of Testing and Examination:</b>
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Requirements for the module examination (written examination): successful work with exercises
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<b>Length of Course:</b>
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1 semester
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**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)