

Module: Specialization I

Module No.: physics610


Course: Theoretical Condensed Matter Physics

Course No.: physics617

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

Requirements:**Preparation:**

Advanced Quantum Theory (physics606)
 Quantum Field Theory (physics755)
 Group theory (physics751)

Form of Testing and Examination:

Requirements for the examination (written): successful work with the exercises

Length of Course:

1 semester

Aims of the Course:

Introduction to the theoretical standard methods and understanding important phenomena in the Physics of Condensed Matter

Contents of the Course:

Crystalline Solids: Lattice structure, point groups, reciprocal lattice
 Elementary excitations of a crystal lattice: phonons
 Electrons in a lattice; Bloch theorem, band structure
 Fermi liquid theory
 Magnetism
 Symmetries and collective excitations in solids
 Superconductivity
 Integer and fractional quantum Hall effects

Recommended Literature:

N. W. Ashcroft, N.D. Mermin, Solid State Physics (Saunders College 1976)
 P. M. Chaikin, T.C. Lubensky; Principles of Condensed Matter Physics (Cambridge University Press 1997)
 W. Nolting; Grundkurs Theoretische Physik Band 7: Vielteilchentheorie (Springer, Heidelberg 2002)
 Ch. Kittel; Quantentheorie der Festkörper (Oldenburg Verlag, München 3. Aufl. 1989)