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)