

Secondary Area of Specialization: Condensed Matter Physics

Identification number MN-P-PN-CondMat	Workload 360 h	Credits 12 CP	Term of studying 1 st and 2 nd semester	Frequency of occurrence Details are provided online in the table "Course Offerings".	Duration 2 semesters
1	Type of lessons a) Lecture b) Problem class c) Exam	Contact times depending on the individual choice 1 h	Self-study times depending on the individual choice 24 h	Intended group size 15–20 students per problem class	
2	Aims of the module and acquired skills Students shall deepen their understanding and knowledge of the main concepts (experimental & theoretical) of condensed matter physics and get familiar with some important experimental methods in condensed matter physics. In specialized courses selected up-to-date research topics of experimental condensed matter physics are discussed as applications of the main concepts.				
3	Contents of the module The module is subdivided into core courses and specialized courses: 1. Core course <ul style="list-style-type: none"> • Condensed Matter Physics I (3+1 HPW, 6 CP): Crystal structure and binding, Reciprocal space, Lattice dynamics and thermal properties, Free electron gas • Condensed Matter Physics II (3+1 HPW, 6 CP): Band structure, Metals and semiconductors, Transport properties, Dielectric function and screening, Superconductivity, Magnetism 2. Specialized courses <ul style="list-style-type: none"> • Experimental Methods of Condensed Matter Physics (2 HPW, 3 CP) • Superconductivity and Nanoscience (2 HPW, 3 CP) • Magnetism (2 HPW, 3 CP) • Semiconductor Physics (2 HPW, 3 CP) • Photons and Matter (2 HPW, 3 CP) • Physics of Surfaces and Nanostructures (2 HPW, 3 CP) • Introduction to Neutron Scattering (2 HPW, 3 CP) • Optical Spectroscopy (2 HPW, 3 CP) • Fundamentals of Spintronics (2 HPW, 3 CP) • and others, including fitting courses from Bonn University, if approved by the module coordinator The contents of the specialized courses can be found in the "kommentiertes Vorlesungsverzeichnis" and in the lecture descriptions online.				
4	Teaching/Learning methods Besides the teaching in lectures, the self-study based on books and lecture notes plays an important role. The students work individually on problem sets. In discussions with others and in the problem classes, they learn to solve challenging problems in a team and to present their approaches and results.				

5	Requirements for participation Physics at the level of the bachelor courses in physics
6	Type of module examinations The module is passed by passing an oral examination covering the topics of all attended courses. To be admitted to the exam, students must actively participate in the problem sessions (including the solution of homework problems). The grade given for the module is equal to the grade of the oral examination.
7	Requisites for the allocation of credits The Secondary AoS Condensed Matter Physics is composed of: <ol style="list-style-type: none"> 1. The core course Condensed Matter Physics I (Lectures and Exercises, 3+1 HPW) 2. Two specialized courses (2 HPW) in Condensed Matter Physics. Alternatively, the core course Condensed Matter Physics II (3+1 HPW) can be chosen instead of the two specialized courses.
8	Compatibility with other Curricula and Soft Skills As elective subject in other M.Sc. programs. Scientific reading and presentation skills, in particular oral presentations. Computer aided analysis of scientific data.
9	Significance of the module mark for the overall grade The weight of the module is $12/111 \approx 8.9\%$.
10	Module coordinator J. Hemberger
11	Additional information Detailed information on the occurrence and the course contents are provided online and in the "kommentiertes Vorlesungsverzeichnis". Version: 05.06.2015 HK