

Module title		Abbreviation
Theoretical Solid State Physics		11-TFK-Int-201-mo1
Module coordinator		Module offered by
Managing Director of the Institute of Theoretical Physics and Astrophysics		Faculty of Physics and Astronomy
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
<p>The contents of this two-term course will depend on the choice of the lecturer, and may include parts of the syllabus which could alternatively be offered as „Quantum Many Body Physics“ (11-QVTP).</p> <p>A possible syllabus may be:</p> <ol style="list-style-type: none"> 1. Band structure (Sommerfeld theory of metals, Bloch theorem, k.p approach and effective Hamiltonians for topological insulators (TIs), bulk-surface correspondence, general properties of TIs) 2. Electron–electron interactions in solids (path integral method for weakly interacting fermions, mean field theory, random phase approximation (RPA), density functional theory) 3. Application of mean field theory and the RPA to magnetism 4. BCS theory of superconductivity 		
Intended learning outcomes		
In-depth knowledge of the topics listed above. In-depth understanding of the concepts involved and ability to apply the methods listed. This provides a thorough working knowledge of a large number of topics treated in the standard textbooks on theoretical solid state physics.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (4) + R (2) Module taught in: English		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes).</p> <p>If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest.</p> <p>Assessment offered: In the semester in which the course is offered and in the subsequent semester</p> <p>Language of assessment: English</p>		
Allocation of places		
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Additional information		
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Workload		
240 h		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in

Master's degree (1 major) Physics International (2020)
Master's degree (1 major) Quantum Engineering (2020)
exchange program Physics (2023)
Master's degree (1 major) Quantum Engineering (2024)
Master's degree (1 major) Physics International (2024)