

<b>Module title</b>		<b>Abbreviation</b>
Theoretical Solid State Physics		11-TFK-161-m01
<b>Module coordinator</b>		<b>Module offered by</b>
Managing Director of the Institute of Theoretical Physics and Astrophysics		Faculty of Physics and Astronomy
<b>ECTS</b>	<b>Method of grading</b>	<b>Only after succ. compl. of module(s)</b>
8	numerical grade	--
<b>Duration</b>	<b>Module level</b>	<b>Other prerequisites</b>
1 semester	graduate	--
<b>Contents</b>		
<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"> <li>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)</li> <li>2 Electron-electron interactions in solids (path integral method for weakly interacting fermions, mean field theory, random phase approximation (RPA), density functional theory)</li> <li>3 Application of mean field theory and the RPA to magnetism</li> <li>4 BCS theory of superconductivity</li> </ol>		
<b>Intended learning outcomes</b>		
<p>During the two-semester lecture, the students acquire a basic understanding of many topics of Solid-State Physics, which are addressed in classical textbooks, and thereby advance their knowledge of the underlying concepts and the methods of description. The course builds upon the courses "Experimental Condensed Matter Physics" and "Quantum Mechanics".</p>		
<b>Courses</b> (type, number of weekly contact hours, language — if other than German)		
V (4) + R (2) Module taught in: German or English		
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>written examination (approx. 90 to 120 minutes) or oral examination of one candidate each (approx. 30 minutes) or oral examination in groups (groups of 2, approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages) or 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                  Language of assessment: German and/or English</p>		
<b>Allocation of places</b>		
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<b>Additional information</b>		
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<b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)		
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<b>Module appears in</b>		
Master's degree (1 major) Mathematics (2016) Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016)		

Master's degree (1 major) Mathematical Physics (2016)  
Master's degree (1 major) Computational Mathematics (2016)  
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)  
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)  
Master's degree (1 major) Computational Mathematics (2019)  
Master's degree (1 major) Mathematics (2019)  
Master's degree (1 major) Nanostructure Technology (2020)  
Master's degree (1 major) Physics (2020)  
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)  
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)  
Master's degree (1 major) Mathematical Physics (2020)