

Module title		Abbreviation
Theoretical Mechanics and Quantum Mechanics for FOKUS Students		11-TQM-F-092-m01
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)
16	numerical grade	10-M-PHY1 and 10-M-PHY2 or 10-M-NST1 and 10-M-NST2 and 11-TQM-1, 11-KP
Duration	Module level	Other prerequisites
2 semester	undergraduate	--
Contents		
Newtonian mechanics. Lagrangian and Hamiltonian formalism. Symmetries and conservation laws. Applications: Problems of central forces, minor vibrations, rigid body, motion in electromagnetic fields. Relativistic dynamics. Limits of classical physics. Schrödinger equation, mathematical principles of quantum mechanics, harmonic oscillator. Angular momentum and spin. Hydrogen atom. Methods of approximation. Motion in electric fields. Many-particle systems		
Intended learning outcomes		
The students have gained first experiences concerning the working methods of Theoretical Physics. They are familiar with the principles of theoretical mechanics and their different formulations and understand the principles of quantum theory. They are able to apply the acquired calculation methods and techniques to simple problems of Theoretical Physics and to interpret the results. They have especially acquired knowledge of basic mathematical concepts.		
Courses (type, number of weekly contact hours, language — if other than German)		
Theoretische Mechanik (Theoretical Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester) Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students): V (4 weekly contact hours) + Ü (2 weekly contact hours) + T (1 weekly contact hour), once a year (block taught during semester break between summer and winter semester)		
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>This module has the following assessment components</p> <ol style="list-style-type: none"> <li>Topics covered in lectures and exercises in part 1 (Theoretische Mechanik (Theoretical Mechanics)): written examination (approx. 120 minutes).</li> <li>Topics covered in lectures and exercises in part 2 (Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students)): written examination (approx. 120 minutes).</li> <li>Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).</li> </ol> <p>Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2.</p> <p>To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Theoretische Mechanik (Theoretical Mechanics) and Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students). The topics discussed in these two courses will be covered in assessment component 3.</p> <p>Students must register for assessment components 1 through 3 online (details to be announced).</p> <p>To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3.</p> <p>The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.</p>		
Allocation of places		
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#### Additional information

Students who intend to study the FOKUS Master's degree programme must take Quantenmechanik für FO-KUS-Studierende (Quantum Mechanics for FOKUS Students) instead of Quantenmechanik (Quantum Mechanics).

#### Workload

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#### Teaching cycle

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#### Referred to in LPO I (examination regulations for teaching-degree programmes)

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#### Module appears in

Bachelor' degree (1 major) Physics (2010)  
 Bachelor' degree (1 major) Physics (2012)  
 Bachelor' degree (1 major) Nanostructure Technology (2010)  
 Bachelor' degree (1 major) Mathematical Physics (2009)  
 Bachelor' degree (1 major) Mathematical Physics (2012)