

Module title		Abbreviation
Theoretical Physics for Students of Nanostructure Technology		11-TP-N-122-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	--
Duration	Module level	Other prerequisites
2 semester	undergraduate	--
Contents		
Physical laws and elementary methods of Theoretical Physics. Mechanics: Newton's laws, physical values and conservation laws, systems of mass points, reference systems, one-dimensional motion, Lagrange equations, applications, Hamiltonian dynamics. Quantum mechanics: Schrödinger equation, one-dimensional quantum mechanics, abstract quantum mechanics (operator formalism), angular momentum, spin. Electrodynamics: Maxwell equations, electrostatics, magnetostatics, dynamics of electromagnetic fields, special relativity. Thermodynamics: Heat, entropy, thermal equilibrium, measurands, level of efficiency, thermodynamic potentials, phase transitions.		
Intended learning outcomes		
The students know the basic principles, contexts and elementary methods of Theoretical Physics, theoretical mechanics, quantum mechanics, thermodynamics, electrodynamics and Statistical Physics.		
Courses (type, number of weekly contact hours, language — if other than German)		
Theoretische Physik 1 (Lehramt, Nanostrukturtechnik) (Theoretical Physics 1 (Teaching Degree, Nanostructure Technology)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester) Theoretische Physik 2 (Lehramt, Nanostrukturtechnik) (Theoretical Physics 2 (Teaching Degree, Nanostructure Technology)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester) Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester) Quantenmechanik (Quantum Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer 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)		
This module has the following assessment components 1. Topics covered in lectures and exercises in part 1 (Theoretische Physik 1 (Theoretical Physics 1)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 30 minutes). 2. Topics covered in lectures and exercises in part 2 (Theoretische Physik 2 (Theoretical Physics 2)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 30 minutes). 3. Topics covered in lectures and exercises in part 1 (Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 30 minutes). 4. Topics covered in lectures and exercises in part 2 (Quantenmechanik (Quantum Mechanics)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 30 minutes). 5. Topics covered in lectures and exercises in part 2 (Quantenmechanik für FOKUS-Studierende (Quantum Mechanics for FOKUS Students)): written examination (approx. 120 minutes, usually chosen) or oral examination of one candidate each (approx. 30 minutes).		

6. Topics covered in lectures and exercises in parts 1 and 2 (assessment in modules Theoretische Physik (Theoretical Physics) 1 and 2): oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).
7. Topics covered in lectures and exercises in parts 1 and 2 (assessment in module Theoretische Physik für Studierende der Nanostrukturtechnik (Theoretical Physics for Students of Nanostructure Technology)): oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).

Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 through 5.

To qualify for admission to assessment component 6, students must pass assessment component 1 and/or 2.

To qualify for admission to assessment component 7, students must pass assessment component 3 and/or 4 and/or 5.

Students are highly recommended to attend both courses Theoretische Physik 1 (Theoretical Physics 1) and Theoretische Physik 2 (Theoretical Physics 2) or, respectively, both courses Statistische Mechanik (Statistical Mechanics) and Thermodynamik und Quantenmechanik (Thermodynamics and Quantum Mechanics). The topics discussed in these courses will be covered in assessment component 6 or, respectively, assessment component 7.

Students must register for assessment components 1 through 7 online (details to be announced).

To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 6 or students must first pass assessment component 3, 4 or 5 and must then pass assessment component 7.

The grade achieved in assessment component 1 or 2 (whichever is better) or, respectively, in assessment component 3, 4 or 5 (whichever is the best) and the grade achieved in assessment component 6 or, respectively, assessment component 7 will each count 50% towards the overall grade awarded for the module.

Allocation of places

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Additional information

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

§ 77 (1) 1. c) Physik "Theoretische Physik"

Module appears in

Bachelor' degree (1 major) Nanostructure Technology (2012)