

Module title		Abbreviation
Mathematics 3 and 4 for Physicists and Engineers		11-DFS-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	--
Duration	Module level	Other prerequisites
2 semester	undergraduate	--
Contents		
Principles of common and partial differential equations in Physics as well as function analysis and theory. The lecture of the module component 11-DFS-1 covers common differential equations, systems of differential equations and partial differential equations. The lecture of the module component 11-DFS-2 covers basic knowledge of functional analysis, which is needed in the course Quantum mechanics I. The definition of Hilbert space explains quantum mechanical states as vectors. The non-visualised form of quantum mechanics, the depiction as wave function created through basic states and the Dirac bracket formalism make up an important part of the formal framework of quantum mechanics.		
Intended learning outcomes		
The students have basic mathematical knowledge of dynamic equations and solution methods for common and partial differential equations. In addition, they have basic knowledge of the mathematics of Hilbert space and the theory of functions of complex variables and are familiar with the corresponding calculation methods.		
Courses (type, number of weekly contact hours, language — if other than German)		
Mathematik 3 (Mathematics 3): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester) Mathematik 4 (Mathematics 4): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer 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"> 1. Topics covered in lectures and exercises in part 1 (Mathematik 3 (Mathematics 3)): written examination (approx. 120 minutes). 2. Topics covered in lectures and exercises in part 2 (Mathematik 4 (Mathematics 4)): written examination (approx. 120 minutes). 3. 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). <p>Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. 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 Mathematik 3 (Mathematics 3) and Mathematik 4 (Mathematics 4). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. 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
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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)