## Module description

Mathematics 4 for Students of Physics and related Discipline (Complex Analysis)       1nt-MF-152-m01         Module offered by       Faculty of Physics and Astronomy         Anageing Director of the Institute of Theoretical Physics and Astronomy       Faculty of Physics and Astronomy         RTS       Method of grading       Only after succ. compL of module(s)         Bummerical grade           Data       Module level       Other prerequisites          I semesite       Undergraduate           Semesite       Undergraduate           Context:       Undergraduate           Context:       Undergraduate            Context:       Undergraduate	Module title					Abbreviation	
Managing Director of the Institute of Theoretical Physics       Faculty of Physics and Astronomy         and Astrophysics       Faculty of Physics and Astronomy         ECTS       Method of grading       Only after succ. compl. of module(s)         numerical grade          Duration       Module level       Other prerequisites         1 semester       undergraduate          Contemts       Same steer opens up understanding of quantum mechanical states as vectors. The representation-free form of quantum mechanics and the representation as a wave function generated by basic states form an important element of the formal framework of quantum mechanics in the so-called bracket formalism by Dirac.         Fundamentals of partial differential equations in physics and systems of differential equations.       Part I: functional analysis         1.1 Linear operators       1.4 Eunction space, completion, Lebesgue integral, Hilbert space       1.5 Linear operators on the Hilbert space         1.6 Matrix representation of operators       1.8 The Dirac delta function and its different representations       Part I: differential equations         2.1 Linear operators       2.1 Linear aperator       2.1 Linear aperator       2.1 Linear aperator         2.1 Linear operators       2.1 D and 3 D wave equation       2.1 Elemental equations       2.1 Elemental equations         2.1 Linear partial differential equations       2.1 D and 3 D wave equation       2.3 Hellmholtz equa							
and Astrophysics       Only after succ. compl. of module(s)         ECTS       Method of grading       Only after succ. compl. of module(s)         8       numerical grade       -         8       numerical grade       -         1 semester       undergraduate       -         Basic knowledge of functional analysis that is required in the course Quantum Mechanics I. The definition of Hilbert space opens up understanding of quantum mechanical states as vectors. The representation-free form of quantum mechanics and the representation as a wave function generated by basic states form an important element of the formal framework of quantum mechanics with the so-called bracket formalism by Dirac.         Fundamentals of partial differential equations in physics and systems of differential equations.       Part I: functional analysis         1.1 Linear vector spaces       1.2 Metric, standardized spaces       1.3 Linear operators         1.2 Metric, standardized spaces       1.3 Linear operators       1.4 Function space, completion, Lebesgue integral, Hilbert space         1.5 Linear operators on the Hilbert space       2.1 Dards Jow execquation       2.2 Dards Jow execquation         2.1 Dards Jow execquation       2.1 Linear partial differential equations of 2nd order       2.2 Dards Jow execquation         2.2 Jow and So wave equation       2.3 Helmholtz equation and potential theory       2.4 Parabolic differential equations         2.4 Parabolic differential equations of partial differential equations	Module coordinator				Module offered by		
8       numerical grade					Faculty of Physics and Astronomy		
Duration         Module level         Other prerequisites           1 semester         undergraduate            Contents             Basic knowledge of functional analysis that is required in the course Quantum Mechanics I. The definition of Hilbert space opens up understanding of quantum mechanics as a wave function generated by basic states form an important element of the formal framework of quantum mechanics with the so-called bracket formalism by Dirac.           Fundamentals of partial differential equations in physics and systems of differential equations.            Part I: functional analysis         1.1 linear vector spaces         1.2 linear operators           1.3 linear operators         Hellbert space         1.5 linear operators         1.6 linear operators           1.4 function space, completion, Lebesgue integral, Hilbert space         1.5 linear operators on the Hilbert space         1.6 linear operators           1.6 Matrix representation of operators         2.1 definetnial equations         2.2 varial differential equations         2.2 varial differential equations         2.2 varial differential equations         2.1 linear partial differential equations         2.1 linear operators on the had potential theory         2.4 Parabolic differential equations         2.1 linear partial differential equations         2.1 and 30 wave equation         2.3 Helmholtz equation and potential theory         2.4 Parabolic differential equations         2.4 conduct space         Method basic knowled	ECTS Method of grading Only a			Only after succ. con	nly after succ. compl. of module(s)		
1 semester       undergraduate          Contents         Basic knowledge of functional analysis that is required in the course Quantum Mechanics I. The definition of Hilbert space opens up understanding of quantum mechanical states as vectors. The representation-free form of quantum mechanics and the representation as a wave function generated by basic states form an important element of the formal framework of quantum mechanics with the so-called bracket formalism by Dirac. Fundamentals of partial differential equations in physics and systems of differential equations.         Part I: functional analysis       1.1 Linear vector spaces         1.2 Metric, standardized spaces       1.3 Linear operators         1.3 Linear operators       1.4 Function on the Hilbert space         1.4 Function space, completion, Lebesgue integral, Hilbert space       1.5 Linear operators         1.8 The Dirac delta function and its different representations       2.1 and 30 Wave equation         2.1 Bard 30 Wave equation       2.2 Hoard 30 Wave equation         2.2 Hoard 30 Wave equation       2.3 Helmholtz equation and potential theory         2.4 Parabolic differential equations       1.1 Intervential equations         2.4 Parabolic differential equations       1.1 Entenvential differential equations         2.4 Dand 30 Wave equation       2.3 Helmholtz equation and potential theory         2.3 Dand 30 Wave equation       2.3 Helmholtz equation and potential theory         2.4 Parabolic differential equation	8	nume	rical grade				
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V (4) + Ü (2) Module taught in: Ü: German or 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) written examination (approx. 120 minutes) Language of assessment: German and/or English Allocation of places  Additional information  Workload	The student has basic knowledge of mathematics and basic knowledge of Hilbert space mathematics, as well as knowledge of solution methods for partial differential equations and is proficient in the necessary computing						
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module is creditable for bonus) written examination (approx. 120 minutes) Language of assessment: German and/or English Allocation of places Additional information Workload							
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	Additional information						
240 h	Worklo	ad					
	240 h						

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## Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Physics (2015) Bachelor' degree (1 major) Nanostructure Technology (2015) Bachelor' degree (1 major) Physics (2020) Bachelor' degree (1 major) Nanostructure Technology (2020) Bachelor' degree (1 major) Functional Materials (2021) Bachelor' degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

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