Module title			Abbreviation
Mathematics 3 for Students of Physics and related Disciplines (Differential Equations)			11-M-D-152-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)**	
8	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Basics of ordinary differential equations in physics.
Ordinary differential equations and systems of differential equations.
Fundamentals of function theory.

1. Ordinary differential equations
1.1 Solution methods
1.2 Existence and uniqueness theorem
1.3 Systems of differential equations
1.4 Greens function for inhomogeneous problems
1.5 Hermitsche DGL, Legendre DGL

2. Function theory
2.1 Complex functions
2.2 Differentiation, holomorphic functions
2.3 Singularities in the complex
2.4 Complex integration and the Cauchy integral theorem
2.5 Laurent series, residual theorem, Fourier transformation
2.6 Analytical continuation, meromorphic functions, whole functions
2.7 gamma, beta, hypergeometric functions, sets of
Weierstrasse and Mittag-Leffler
2.8 Differential equations in the complex, Bessel differential equation
2.9 Saddle point method

3. (quasi) linear differential equations of 1st order

Intended learning outcomes

The student has basic knowledge of mathematics to understand the dynamic equations and knowledge of solution methods for ordinary differential equations as well as the theory of the functions of a complex variable and is proficient in the required computing techniques.

Courses (type, number of weekly contact hours, language — if other than German)

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

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Additional information

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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 (2015)
Bachelor' degree (1 major) Nanostructure Technology (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)