Valid from 2024.HS

Module description: Analysis 3

Module Code	t.BA.XXM8.AN3.20HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IAMP
Module Coordinator	Andreas Henrici
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 3a 2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
Module Description	In this module, students learn about linear ordinary differential equations and systems of first-order ODEs. In addition, the basic properties and calculus of functions of several variables are discussed. Moreover, the basic concepts of Fourier analysis are explained and applied to examples.
Module Content	**Ordinary differential equations:** **Linear ODE‘s of arbitrary order (2 SW)** **Systems of linear ODE‘s (2 SW)** **Calculus of functions of several variables:** **Functions of several variables: Basics (1 SW)** **Partial differentiation, tangent plane, gradient, directional derivative, Jacobi/Hesse matrix (1-2 SW)** **Extreme value problems without/with side condition (1-2 SW)** **Multiple integrals with applications (2 SW)** **Fourier analysis:** **Fourier series (1-2 SW)** **Fourier transform (1 SW)** **Discrete Fourier transform (1-2 SW)**
Prerequisite Knowledge	Analysis 1,2Linear Algebra 1,2

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Learning Objectives (Competences)

Students...	Competencies	Taxonomies
You are acquainted with the important notions and concepts concerning the derivative of functions of several variables, in particular partial derivatives, gradient, directional derivative and Jacobi / Hesse matrix.	M, F	K2, K3
You know the basic concepts of Fourier analysis, and you know the methods for the computation of Fourier series as well as continuous and discrete Fourier transforms, and can apply these methods to examples.	F, M	K2, K3
You know methods for solving linear ODE's with constant coefficients of arbitrary order and systems of first-order ODE's, and you are able to apply these methods to examples.	F, M	K3
You know methods for solving extreme value problems in functions of several variables and are able to apply these methods to examples.	F, M	K2, K3
You are acquainted with functions of several variables, in particular with the various ways of representing these functions.	F, M	K2, K3
You are able to decide for a given ODE, whether it is linear or not, and whether there exist analytical solution methods.	M, F	K2
You know the concept and the significance of multiple integrals, and you know the most important methods for computing such integrals, and you are able to apply these methods to examples.	F, M	K2, K3

Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	100	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
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Classroom Attendance Requirement

None

Learning material

Comments