

Module title					Abbreviation
Introduction to Functional Analysis					10-M-FAN-202-m01
Module coordinator				Module offered by	
Dean of Studies Mathematik (Mathematics)				Institute of Mathematics	
ECTS Method of grading		Only after succ. compl. of module(s)			
5	(not) s	successfully completed			
Duration		Module level	Other prerequisites		
1 semester		undergraduate			
Contents					
ty; linear operators, function spaces (LAP spaces of continuous functions, Sobolev spaces), denseness, separabili- ty; linear operators, fundamental theorems for linear operators; Baire's theorem, uniform boundedness princi- ple, open mapping theorem, closed graph theorem; linear functionals and dual spaces; Hahn-Banach theorem (extension theorem, separation theorem), double dual space and reflexivity; weak convergence, Banach-Alao- glu theorem, adjoint operator, closed range theorem; Hilbert spaces: Fréchet-Riesz representation theorem, or- thonormal systems; compact sets and operators, Arzela-Ascoli theorem; spectral theory: basic notions, spectral theory of compact normal and self-adjoint operators in Hilbert spaces.					
Intended learning outcomes					
The student knows the fundamental concepts and methods of functional analysis as well as the pertinent proof methods, is able to apply methods from linear algebra and analysis to functional analysis, and realises the broad applicability of the theory to other branches of mathematics.					
Courses (type, number of weekly contact hours, language — if other than German)					
V (4) + Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
a) written examination (approx. 90 to 180 minutes, usually chosen) or b) oral examination of one candidate each (15 to 30 minutes) or c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate) Language of assessment: German and/or English creditable for bonus					
Allocation of places					
Additional information					
Workload					
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Bachelor's degree (1 major) Mathematical Physics (2020)					
Bachelor's degree (1 major) Mathematical Physics (2024)					
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