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Universität Ulm

Bachelor Mathematics (PO 2014)

Elements of Functional Analysis

Code	8210570024
ECTS credits	4
Attendance time	3
Language of instruction	german, english
Duration	1 Semester
Cycle	each Summer Semester
Coordinator	Prof. Dr. Friedmar Schulz
Instructor(s)	Professors of analysis
Allocation of study programmes	Mathematik (optional), Wirtschaftsmathematik (optional), Finance (optional)
Recommended prerequisites	Analysis I, II, Linear Algebra I, II; measure theory
Learning objectives	Students will be aware of the core methods of modern analysis become familiar with a sophisticated but not too abstract generalization of linear algebra be able to manage the main principles of Hilbert space theory learn the basic facts for the treatment of partial differential equations, numerical mathematics and other areas of applied mathematics recognize several connections to linear algrebra, differential and integral equations, numerical mathematics, physics and so on
Syllabus	normed spaces, metric spaces, compactness, Arzela-Ascoli theorem, Banachand Hilbert spaces orthogonality, Fourier sequences, orthogonal projection, Riesz representation theorem, linear operators in Banach and Hilbert spaces adjoint, inverse, unitary operators, projectors Toeplitz theorem

binlinear forms, Lax-Milgram theorem
weak convergence, compact operators
Fredholm theorems
spectral theory of compact hermitian operators

Literature   Heuser, H.: Funktionalanalysis, Teubner 1986
Weidmann, J.: Lineare Operatoren in Hilbertr#aumen, Teil I Grundlagen,
Teubner, 2000

Teaching and learning methods   Lecture (2 hours per week), exercise (1 hours per week)

Workload   contact hours: 42 h; independent study: post-processing (28 h), exercises (30 h),
examaination and preparation (20 h); sum: 120

Assessment   No english version available yet.

Grading procedure   No english version available yet.

Basis for   Special courses in spectral theory, nonlinear functional analysis or partial
differential equations.