Module title			Abbreviation
Overview Linear Algebra for Mathematical Physics			10-M-LNP-Ü-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)**	
16	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	--	

Contents

Basic notions and structures: groups, rings, fields, polynomials;matrices: Gauß algorithm, echolon form, rank; vector spaces over arbitrary fields: linear independance, basis, dimension, coordinates, change of basis, sums, direct sums and quotients of subspaces, linear maps, kernel and image, dimension theorem, matrix representation, determinants. Eigenvalue theory: characteristic polynomial, Caley-Hamilton theorem, minimal polynomial, invariant subspaces, diagonalisability, nilpotent maps, Jordan normal form; Euclidean/unitary spaces: scalar product, orthonormal bases, orthogonal complement, ortogonal/unitary matrices, selfadjoint and normal matrices, positive definit matrices.

Intended learning outcomes

The student knows and masters the essential methods and proof techniques of linear algebra and is able to apply them independently. He/She has an overview over the fundamental notions and methods of linear algebra, knows about their algebraic and geometric background, is able to relate them to each other and can present them adequately in written and oral form.

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

V (4) + 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)

oral examination of one candidate each (20 to 40 minutes)
Assessment will have reference to the contents of modules 10-M-LNAP1 and 10-M-LNP-Ü.
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

480 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Mathematical Physics (2020)
Bachelor's degree (1 major) Mathematical Physics (2024)
Bachelor's degree (1 major) Mathematical Physics (2026)