

The contents of analytical geometry and linear algebra at the University of Göttingen are listed below.

Courses that contain these topics will be counted towards your Master's Degree application in the area "analytical geometry and linear algebra", only. This means they count up to at most 16 ECTS.

Contents of analytical geometry and linear algebra:

1. Basic knowledge: Sets and maps, proofs: Proof by contradiction, Induction. Basics of groups, rings (in particular polynomial rings), fields; Introduction of complex numbers and residue fields.
2. Structures of vector spaces: linear dependence, basis, dimension; linear maps and fundamental theorem of homomorphisms.
3. Matrices I: Gaussian algorithm, trace and determinant, permutations, Cramer rule, solving of linear systems.
4. Eigenvalues: Characteristic polynomial, diagonalisability, Cayley-Hamilton theorem.
5. Euclidean geometry, geometry of unitary transformations Scalar products and norms, orthogonality, normal maps, euclidean and unitary vector spaces.
6. Quadratic and hermitian forms, Principal axis theorem, Sylvester's law of inertia
7. Affine and projective geometry
8. Matrices II: Jordan normal form, matrix exponentials
9. Multilinear algebra: tensor products and tensor algebras, exterior product.