

Only the german version of the module description as part of the study regulations is legally binding.

Module name	Linear algebra and analysis
Module number	INF-25-Ba-Ma1
Responsible lecturer	Prof. Dr. Ulrike Baumann ulrike.baumann@tu-dresden.de
Qualification objectives	Students are familiar with basic mathematical concepts, notation and forms of argumentation using the example of linear algebra, the systematic theory structure and the abstract concept of structure based on this. They can handle the objects of linear algebra mathematically and algorithmically and apply this to problems in computer science. Students know the exact form utilized limit concept of real analysis and are able to understand the elementary terms and methods of real analysis, in particular the concept of convergence and approximation. They are able to apply methods of real analysis to problems in computer science. They are able to understand methods of differential calculus in one and several variables and apply them to solve problems. Students will be able to handle the concepts of the areas mentioned at confidently in terms of mathematical working methods. In particular, they can formulate facts from the above-mentioned fields of knowledge in a mathematically correct way and prove.
Content	The module covers the topics of linear algebra as a mathematical theory for computer science and the introduction to real analysis. The contents include vector spaces over the body of real numbers, the body of complex numbers and over the body $GF(2)$, linear mappings including representation matrices, determinants and their applications, in particular for the diagonalization of matrices, solving linear systems of equations and calculating eigenvalues as well as the methods of orthogonal projection and the best approximation for Euclidean vector spaces. In the subject area of real analysis, the module includes the convergence of sequences and series, the representation of functions as power series and elements of differential calculus, in particular Taylor's theorem for real functions in one or more variables and properties of continuous functions, in particular the intermediate value theorem.
Teaching and learning methods	The module comprises lectures of 4 SWS, exercises of 2 SWS and the selfbststudium. The language of instruction for the lectures and exercises is German.
Prerequisites for participation	Knowledge of mathematics at A-level is required.
Applicability	The module is a compulsory module in the Diploma degree program in Computer Science in the foundation course. The module is a compulsory module in the Bachelor's degree course in Computer Science and in the Bachelor's degree course in Applied Computer Science. The module creates the prerequisites for the modules that name it as a prerequisite

	for participation.
Requirements for earning credit points	The credit points are earned if the module examination is passed. The module examination consists of a written examination lasting 120 minutes. The examination language is German.
Credit points and grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination.
Module frequency	The module is offered every winter semester.
Workload	The total workload is 270 hours.
Module duration	The module comprises one semester.