2.1.1 Mathematics 1

Mathematics 1

Module Summary
Module code: EEIB110
Module coordinator: Prof. Dr. Thomas Westermann
Credits (ECTS): 7 Points
Semester: 1. Semester
Pre-requisites with regard to content: none
Pre-requisites according to the examination regulations: Regarding to the examination regulations no pre-requisites are required
Competencies: The participants master the elementary basics of engineering mathematics by • calculating with real numbers and performing transformations in this number range • performing mathematical proofs, especially with the help of mathematical induction • mastering the handling of complex numbers and being able to perform transformations, solve equations as well as inequalities and interpret them geometrically • solving systems of linear equations with and without parameters using the Gaussian elimination method • using the methods of vector calculus to solve geometric problems, describing direction-dependent quantities by vectors and visualizing geometric views in the plane and in space to abstract issues • calculating with elementary functions, mastering transformations of and with functions to sketch these functions • being able to interpret the limit value concept of sequences and calculating limit values of various sequences • performing limit processes for real functions: Working confidently with difference and differential quotients and mastering the derivative calculus.
Usability: This module introduces the foundations for engineering mathematics. The module is the basis for the modules Mathematics 2 and Mathematics 3.

Course: Mathematics 1
Module code: EEIB110
Lecturer: Prof. Dr. Stefan Ritter, Prof. Dr. Thomas Westermann
Scope of weekly semester hours (SWS): 6
Semester of delivery: Winter semester
Type/mode: Lecture, Compulsory subject
Language of instruction: English
Content: • Sets and numbers • Mathematical proof techniques • Complex numbers • Linear systems of equations • Vector calculus and analytic geometry • Elementary functions • Sequences • Limits and continuity of functions • Derivation of functions
Recommended reading: • Westermann, T: Mathematics for Engineers (Part 1), iMath 2021, 1st Edition • Problems: iMath-Problems App, Apple App Store/Android PlayStore • www.home.hs-karlsruhe.de/~weth0002 • Goebbels, S. und Ritter, S.: Mathematik verstehen und anwenden, Springer-Spektrum 2013, 2. Auflage • Westermann, T: Mathematik für Ingenieure, Springer 2020, 8. Auflage