

Module Name	Automata and Computability Theory
Module Number	INF-IST-C-AuB
Responsible Lecturer	Prof. Dr. Markus Krötzsch markus.kroetzsch@tu-dresden.de
Qualification Objectives	Students master the fundamentals of representation, analysis, and processing of formal languages. They are familiar with various approaches to specifying syntax and can analyze and compare these approaches with respect to different structural properties. They understand the relationship between formal languages and important formal models of computation and comprehend the capabilities and limitations of these models.
Contents	The module covers topics in the areas of Formal Languages, Automata Theory, and Computability, such as: the Chomsky hierarchy with the classes of regular, context-free, context-sensitive, and Type-0 languages; representations of formal languages such as grammars, automata models, and regular expressions; methods for analyzing the properties of formal languages; word problems and other computational problems and methods for solving them; finite automata, pushdown automata, and Turing machines; determinism and non-determinism in automata models; additional computational models such as WHILE and LOOP programs or recursive functions; computability theory, including relevant basic concepts, typical undecidable problems, and uncomputable functions.
Teaching and Learning Forms	4 hours per week of lectures, 2 hours per week of exercises, and self-study.
Prerequisites for Participation	The competencies to be acquired in the modules Introduction to Analysis and Algebra, Multidimensional Differential and Integral Calculus, Discrete Structures, and Algorithms and Data Structures are required.
Usability	The module is a compulsory module of the main study program in the diploma program Information Systems Engineering. It creates the prerequisites for the modules that list this module in the field "Prerequisites for Participation."
Prerequisites for the Award of Credit Points	Credit points are awarded when the module examination is passed. The module examination consists of a written exam lasting 90 minutes.
Credit Points and Grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the Module	The module is offered every winter semester.
Workload	The total workload is 270 hours.
Duration of the Module	The module lasts one semester.