

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

Module name	<b>Advanced logics</b>
Module number	INF-25-Ma-FTK-AL
Responsible lecturer	Christel Baier christel.baier@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific methods of the field of logic in computer science, in particular of evidence and model theory. They know the central concepts of first- and second-level predicate logic, can mathematically correctly reproduce, formally substantiate and apply its core statements, and are able to derive and prove independently based statements on the algorithmic and complexity-theoretical aspects of mathematical logic.
contents	Contents of the module are various aspects of predicate logic first and second stage and variants thereof. These include systems of evidence, Gödel's propositions, axiomizability, the Löwenheim-Skolem theorem, (in)decisiveness of algorithmic questions such as fulfilment, validity, logical inferences and equivalence, model theory, Ehrenhuh-Fraisse games and the Büchi-Elgot-Trakhtenbrot theorem.
Forms of teaching and learning	The module includes lectures in the scope of 4 SWS and exercises in the scope of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and will be specified by the lecturer at the beginning of each semester and announced in the usual way.
Requirements for participation	In the Computer Science degree program, the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Predictability Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, and INF-25-Ba-Ma4 Probability Theory and Statistics are required. The Master's programme in Computer Science requires knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates, as well as knowledge of mathematics at the bachelor's level.

usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence in the master's degree programme Computer Science, which must be chosen in accordance with Annex 2 to the Examination Regulations. The module in the Master's programme Computer Science is a compulsory elective module in the Open Track in the subject area Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which is to be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme Computer Science. The module cannot be selected in the Master's programme Computer Science if this or a module of substantially the same content from a course of study with which the admission requirements under § 3 of the Study Regulations have been met has already been completed. The module creates the conditions for the modules, which it designates under conditions for participation.
Conditions for awarding credits	The credit points are earned when the module examination has been passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The language of the examination can be German or English and will be specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits 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 summer semester.
workload	The total workload is 270 hours.
Duration of the module	The module consists of 1 semester.