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

Module name	**Proof Theory and Sequent Systems**
Module number	INF-25-Ma-FTK-PT
Responsible lecturer	Dr. Timothy S. Lyon timothy.lyon@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific methods of evidence theory, especially in the field of sequence systems. They know the central concepts of sequence calculus for classical propositional logic, predicate logic, and modal logic, including structural rules, section elimination, and evidence search. Students are familiar with the basic proof theoretical methods, in particular invertibility and admissibility of inference rules, section elimination as well as evidence search algorithms and can mathematically correctly reproduce, formally justify and apply the central definitions and core statements. They are able to derive and prove independently based statements on the mathematical, algorithmic and complexity-theoretical aspects of the theory of evidence.
contents	Contents of the module are syntax and semantics of classical propositional logic, predicate logic first stage and modal logic K; Sequence calculus LK, G3CPL, G3FOL and G3K; the structural rules of attenuation, contraction and swapping; invertibility and admissibility of inference rules; cutting elimination according to the gentzens main set and the partial formula property; correctness and completeness with syntactic and semantic methods; Evidence search algorithms and decision-making of classical propositional logic and modal logic K; and Kripke semantics for modal logic.
Forms of teaching and learning	The module includes lectures in the scope of 2 SWS as well as self-study. The teaching language of the lectures 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, INF-25-Ba-Ma4 Probability Theory and Statistics, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWT Software Technology and INF-25-Ba-AI Artificial Intelligence 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 program Computer Science if this or a substantially identical module from a course of study with which the admission requirements according to § 3 of the study regulations have been fulfilled has already been completed. The module creates the prerequisites for the modules, which it names under prerequisites 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 15 minutes duration. The language of the examination is German or English at the choice of the student.
Credits and grades	3 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 90 hours.
Duration of the module	The module consists of 1 semester.