W2-Professor in Theoretical Computer Science
with a focus on "logic, formal languages and automata"

The purpose of this text is to provide further details on the position of the above-mentioned professor and its role in the Department of Computer Science. This text can be seen as a supplement to the development plan of the department. The expectations, tasks and responsibilities associated with the professorship also serve as a more specific definition of the job description and should help the selection committee to identify suitable candidates. This text should also be made available to applicants.

Thematic classification

Theoretical computer science generally deals with the mathematical structures and the formal modeling of abstract machine models to process and to transmit information. The main areas of theoretical computer science are automata theory, formal languages, computability/complexity theory, algorithm theory, mathematical logic and the semantics of programming languages.

The Department of Computer Science aims to cover the important areas of theoretical computer science with two central professorships[1]. Apart from the professorship described here, a further professorship with a focus on "algorithmics" has just been filled. The position described here should complement the other professor and cover as many of the remaining areas of theoretical computer science as possible. As the focus of the professor of algorithms is on the areas of computability/complexity theory and algorithm theory, the focus of this professorship should be on automata theory, formal languages, mathematical logic and the semantics of programming languages.

Mathematical logic should be in the foreground although all types of mathematical logic come into consideration, e.g. first-order logics and higher-order logics, non-monotonic logics, intuitionistic logics, modal logics, monadic logics, epistemic logics, database logics etc. Many of these logics are closely linked to automata models, as is the case with temporal logics, monadic logics and ω-automata. For this reason, the professor should also consider the theories of formal languages and automata which are closely linked to mathematical logic and should look for applications in the areas of specification and verification as well as semantics of programming languages. The following key areas are specifically listed in the job advertisement:

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[1] There are also other professors working in related and overlapping areas, e.g. Graph Theory, Software Engineering and Embedded Systems. In addition, various topics of theoretical computer science are considered at the Max-Planck Institute for Software Systems.

- Logics for the specification and verification of systems: decision procedures, automatic and interactive verification/proof/analysis procedures like model checking and theorem proving.

- Formal analysis of quantitative properties of systems: timed systems, discrete/continuous (hybrid) systems, probabilistic systems

- Logic and automata theory: process algebras, state-based analysis of systems, verification of systems with infinite state space.

Teaching tasks of the professor

The professor should offer specialized courses in the specialization area on algorithms and deduction in the master and bachelor programs in Computer Science complemented with the specialized area of research. In addition, the professor should teach the compulsory course "Logic and the semantics of programming languages" in the bachelor of Computer Science. Participation in further compulsory courses in the bachelor and master programs in Computer Science is expected, particularly in the compulsory optional block "Theoretical Computer Science" in the master degree course. In addition to relevant research results in the areas of logic and automata theory, the holder of this chair is expected to have a wide area of expertise in all fields of theoretical computer science, so that they can be covered appropriately in teaching.

Tasks of the professor in research

The research of the chair should look at current topics in the areas mentioned and apply for third-party funded projects in particular at the German Research Foundation. Furthermore, the professor is expected to participate in the department's cooperative research applications and deal with any questions regarding theoretical computer science. For this reason, the holder of the chair is expected to have outstanding academic qualifications – proven among other things by highly ranked publications – and experience in acquiring and carrying out third-party funded projects – proven among other things by completed projects. Further criteria for the selection of applicants are cooperation opportunities with other professorships in the department of Computer Science, related professorships in other departments, particularly with the Department of Mathematics and computer-science-related research institutes in Kaiserslautern, in particular the Max-Planck Institute for Software Systems (MPI-SWS), the German Research Center for Artificial Intelligence (DFKI), the Fraunhofer Institute for Experimental Software Engineering (IESE) and the Fraunhofer Institute for Industrial Mathematics (ITWM).