

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

Module name	High Performance Computing
Module number	INF-25-Ma-FTI-HPC
Responsible lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students will be able to describe strategies and methods of parallel processing in parallel computer architectures and assess parallel architectures and network concepts and their suitability for various parallel algorithms. They will be able to develop simple parallel programs that utilize different types of parallelism. They are able to develop simple parallel programs that make different types of parallelism usable.
Content	The module covers the basics of high-performance computers and their programming, strategies and methods of parallel processing, including the program models widely used in supercomputing. Further content includes architecture and network concepts and the necessary algorithmic building blocks in close connection with practical experience from the interdisciplinary works of the CIDS Department Center for Information Services and High Performance Computing (ZIH).
Teaching and learning methods	The module comprises lectures of 2 SWS, exercises of 2 SWS and the self-study. The language of instruction for the lectures and exercises may be German or English and will be determined by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Diploma degree course in Computer Science and in the Bachelor's degree course in Computer Science, the skills to be acquired in the modules INF-25-Ba-RA Computer Architecture and Hardware Laboratory and INF-25-Ba-BS Operating Systems are a prerequisite. In the Master's degree program in Computer Science, knowledge of the structure of computer systems and the use of a Unix command line environment as well as the programming language C at Bachelor's level is required. The following literature is suitable for preparation: Introduction to high performance computing for scientists and engineers, G. Hager, G. Wellein. CRC Press, 2010, Computer Architecture, Fifth Edition: A Quantitative Approach, John L. Hennessy, David A. Patterson. Morgan Kaufmann Publishers Inc, 2011, Programming: principles and practice using C++, Bjarne Stroustrup. Pearson International, 2014, The Linux Command Line, 2nd Ed, W.E. Shotts. No Starch Press, 2019.
Applicability	The module is a compulsory elective module in the Computer Engineering and High Performance Computing subject area in the Diplom degree program in Computer Science in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's degree program in Informatics, the module is a compulsory elective module in the subject specialization, which must be selected in accordance with the appendix to the examination regulations.

	In the Master's degree program in Computer Science, the module is a compulsory elective module in the open track in the subject area of Computer Engineering and High Performance Computing and the supplement, which must be selected in accordance with Annex 2 to the Examination Regulations. The module can only be chosen once in the Master's degree program in Computer Science. The module cannot be selected in the Master's degree program in Computer Science if this module or a module with essentially the same content from a degree program in which the admission requirements according to § 3 of the study regulations have already been met has already been completed. The module creates the prerequisites for the modules listed under prerequisites for participation.
Requirements for earning credit points	The credit points are earned if the module examination is passed. The module examination consists of a written examination lasting 90 minutes. The examination language is English.
Credit points and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination.
Module frequency	The module is offered every winter semester.
Workload	The total workload is 180 hours.
Module duration	The module comprises one semester.