

Module Nr.	Credits	Workload	Semester	Frequency	Duration
SE-O-8	6 CP	180 h	2	Yearly (SS)	1 Semester
Courses			Contact time	Self-study	Group size
High-Performance Computing on Multi- and Manycore Processors			4 h/week	120 h	---
High-Performance Computing on Multi- and Many Core Processors					
Learning outcomes					
After successfully completing the module the students					
<ul style="list-style-type: none"> • are enabled to design and create programs for multi- and manycore processors • can critically evaluate multi-threaded programs and shared-memory access patterns • are able to survey advanced scientific topics independently and present their findings 					
Content					
<p>The lecture addresses parallelization for multi- and many core processors. Thread-based programming concepts (pthreads, C++11 threads, OpenMP, OpenCL) are introduced and best-practice implementation aspects are highlighted based on applications from scientific computing.</p> <p>In the first part, the lecture provides an overview on relevant data structures, solver techniques and programming patterns from scientific computing. An introduction to multi-threading programming on multicore systems is then provided with special attention to shared-memory aspects. Parallelization patterns are discussed and highlighted. Numerical experiments and self-developed software implementations are used to discuss and illustrate the presented content.</p> <p>In the second part, students are assigned advanced topics for shared-memory computation from the engineering science including finite element methods and artificial intelligence. Based on a scientific paper, students present their topic to the lecture audience in form of a beamer presentation and numerical illustrations.</p>					
Teaching Methods					
Lecture (2h / week), Computer lab (2h / week) / English					
Modes of assessment					
Homework (Presentation)					
Requirements for the award of credit points					
Successful homework including presentation, Q&A session after presentation					
Module applicability					
Master Computational Engineering, Master Bauingenieurwesen, Master Angewandte Informatik					
Weight of the mark for the final score					
5 %					
Module coordinator and lecturer(s)					
Jun.-Prof. Dr. Andreas Vogel					
Other information					