# High-Performance Computing on Multicore Processors

| Module-No./Abbreviation | Credits | Workload | Term | Frequency | Duration |
|---|---|---|---|---|---|
| CE-WP25/HPCM | 6 CP | 180 h | 2nd Sem. | Summer term | 1 Semester |

| Courses | Contact hours | Self-Study | Group Size: |
|---|---|---|---|
| High-Performance Computing on Multicore Processors | 4 SWS (60 h) | 120 h | No Restrictions |

**Prerequisites**

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**Learning goals / Competences**

After successfully completing the module, the students

- are enabled to design and create programs for multicore processors,
- can critically evaluate multi-threaded programs and shared-memory access patterns,
- can assess the benefits and challenges of multicore programming techniques.

**Content**

The lecture addresses parallelization on multicore processors. Thread-based programming concepts and techniques (pthreads, C++11 threads, OpenMP, OpenCL) are introduced and best practices are highlighted using applications from scientific computing.

An overview of the relevant hardware aspects including multicore architectures and memory hierarchies is provided. An in-depth introduction to multi-threaded programming on multicore systems with special emphasis on shared-memory parallelization is given and parallelization patterns, thread management and memory access strategies are discussed.

In hands-on sessions, programming exercises are used to discuss and illustrate the presented content.

**Teaching methods / Language**

Lecture (2h / week), Exercises (2h / week) / English

**Mode of assessment**

Written examination (120 min., 100%)

**Requirement for the award of credit points**

Passed final module examination

**Module applicability**

MSc. Bauingenieurwesen, MSc. Subsurface Engineering, MSc. Angewandte Informatik

**Weight of the mark for the final score**

6%

**Module coordinator and lecturer(s)**

Prof. Dr. A. Vogel, Assistants

**Further information**