# High-Performance Computing on Multicore Processors

<table>
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<th>Module-No./Abbreviation</th>
<th>Credits</th>
<th>Workload</th>
<th>Term</th>
<th>Frequency</th>
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<td>CE-WP25/HPCM</td>
<td>6 CP</td>
<td>180 h</td>
<td>2nd Sem.</td>
<td>Summer term</td>
<td>1 Semester</td>
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## Courses
High-Performance Computing on Multicore Processors

## Credits
- 6 CP

## Workload
- 180 h

## Term
- 2nd Semester

## Frequency
- Summer term

## Duration
- 1 Semester

### Prerequisites
- 

### 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