**Module Name:** Introduction to High Performance Computing and Optimization (English)

**Responsible:** Rheinbach, Oliver / Prof. Dr.

**Lecturer(s):** Rheinbach, Oliver / Prof. Dr.

**Institute(s):** Institute of Numerical Mathematics and Optimization

**Duration:** 1 Semester(s)

**Competencies:**
- Parallel numerical algorithms
- Parallel computing on shared and distributed memory multiprocessor systems.

The students know relevant terms in English.

**Contents:**
- Design and analysis of algorithms
- Portable parallel programming with OpenMP and the MPI (Message Passing Interface)
- Code profiling and tracing (VAMPIR) and optimization methods
- BLAS (Basic Linear Algebra Subprograms)
- Parallel Equation Solution (dense/sparse systems)
- LU-Decomposition, Tridiagonal Solvers, Iterative Methods
- International literature and relevant terms in English

**Literature:**

**Types of Teaching:**
- S1 (WS): Lectures (2 SWS)
- S1 (WS): Exercises (1 SWS)

**Pre-requisites:**
- Basics of numerical analysis and knowledge in scientific programming

**Used in:** Computational Science and Engineering, MA (WP)

**Frequency:** yearly in the winter semester

**Requirements for Credit Points:**
- For the award of credit points it is necessary to pass the module exam. The module exam contains:
  - MP/KA: MP = individual examination (KA if 20 students or more) [MP minimum 30 min / KA 120 min]
- Requirements for the module exam:
  - PVL: Programming Project

**Credit Points:** 4

**Grade:**
- The Grade is generated from the examination result(s) with the following weights (w):
  - MP/KA: MP = individual examination [w: 1]

**Workload:**
- The workload is 120h. It is the result of 45h attendance and 75h self-studies.