

Data:	IHPC. MA. Nr. 3210 / Examination number: 11110	Version: 05.03.2015	Start Year: WiSe 2012
Module Name: (English):	Introduction to High Performance Computing and Optimization		
Responsible:	Rheinbach, Oliver / Prof. Dr.		
Lecturer(s):	Rheinbach, Oliver / Prof. Dr.		
Institute(s):	Institute of Numerical Mathematics and Optimization		
Duration:	1 Semester(s)		
Competencies:	<p>The students shall have an understanding of and ability to apply:</p> <ul style="list-style-type: none"> • parallel computing on shared and distributed memory multiprocessor systems • parallel algorithms <p>The students know relevant terms in English.</p>		
Contents:	<p>Ingredients can be:</p> <ul style="list-style-type: none"> • Portable parallel programming with OpenMP and MPI (Message Passing Interface); hybrid parallelization; accelerators • Code profiling, tracing and optimization methods using tools (profiler, VAMPIRE, etc.); • Relevant software libraries (e.g., BLAS, LAPACK, SCALAPACK, etc.) • Design and analysis of algorithms • Parallel solution of linear systems (dense/sparse systems) • International literature and relevant terms in English 		
Literature:	<p>Georg Hager, Gerhard Wellein, Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall, 2010 OpenMP Standard, www.openmp.org Barbara Chapman, Gabriele Jost, Ruud van der Pas, Using OpenMP: portable shared memory parallel programming, MIT Press, 2008 William Gropp, Ewing Lusk, Anthony Skjellum, Using MPI: Portable Parallel Programming with the Message-Passing Interface, MIT press, 2000 Michael Quinn, Parallel Programming in C with MPI and OpenMP, McGraw-Hill, 2003 Anne Greenbaum, Iterative Methods for Solving Linear Systems, SIAM, 1997</p>		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (1 SWS)		
Pre-requisites:	Recommendations: Basics knowledge in scientific programming and algorithms.		
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 30 students or more) [MP minimum 30 min / KA 120 min] PVL: Programming Project PVL have to be satisfied before the examination.		
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-		

