

Study program: Electrical and computer engineering – Module: Computer engineering				
Type and level of studies: Undergraduate academic studies				
Course unit: Parallel Computer Systems				
Teacher in charge: Uros Pešović, teaching assistant Dejan Vujičić				
Language of instruction: English				
ECTS: 5				
Prerequisites: -				
Semester: Winter semester				
<i>Course unit objective:</i> Flynn's classification of computer systems according to program and data flows. Multiprocessor architectures based on global-shared memory. Message passing interface in parallel multicomputer systems. High speed interconnects in parallel computer systems.				
<i>Learning outcomes of Course unit</i> Ability to analyze algorithms and their implementation in the form of parallel computing using different programming models. Understanding advantages and limitations of parallel computing. Classification of parallel computer systems according to program and data flows.				
Course unit contents <i>Theoretical classes</i> High performance computing and parallel computing. Parallelism at the instructional level. Flynn's taxonomy of computer systems (SISD, SIMD, MISD MIMD). Program flow management, data flow management, on-demand management. Data dependencies and data dependency graphs. Speculative execution. Vector supercomputers, very wide instruction word machines and superscalar processors. Parallel computer systems based on global-shared memory. Message exchange mechanism in parallel computer systems. Coupling networks in parallel computer systems. <i>Practical teaching</i> Parallelization of algorithms at the level of loops. Parallelization of algorithms using OpenMP and MPI messaging mechanism. Multi-threaded and distributed execution.				
Literature 1. Hennessy, D. Patterson, Computer architecture: a quantitative approach Morgan Kaufmann Publishers, 2003, ISBN - 1-55860-596-7; 1-55860-724-2 2. R. Trobec, M. Vajteršić, P. Zinterhof, Parallel Computing - Numerics, Applications and Trends, Springer - Verlag , 2009				
Number of active teaching hours				Other classes
Lectures: 2	<i>Practice:</i> 2	<i>Other forms of classes:</i>	<i>Independent work:</i>	
Teaching methods: consultations, independent work				
Examination methods (maximum 100 points)				
Exam prerequisites	No. of points:	Final exam		No. of points:
Student's activity during lectures	0	oral examination		40
Practical classes	0	written examination		30
Seminars/homework	30			
Project				
Grading system				
Grade	No. of points		Description	
10	91-100		Excellent	
9	81-90		Exceptionally good	
8	71-80		Very good	
7	61-70		Good	
6	51-60		Passing	
5	less than 50		Failing	