

Name: Parallel Programing		NEPTUN-code: <i>NIXPEREMNE</i>	Number of periods/week: full-time: 2 lec + 0 sem + 2 lab
Credit: 5 Requirement: exam		Prerequisite: -	
Responsible: Zoltán VÁMOSSY, Ph.D.	Position: associate professor	Faculty and Institute name: John von Neumann Faculty of Informatics Institute of Applied Informatics	
Way of assessment: <ul style="list-style-type: none"> - precondition of signature: successful home project - written exam 			
Competences			
Course description:			
<p>Introduction to parallel computing and parallel computer architectures. Shared and distributed software architectures. PRAM model. Performance characteristics, Amdahl's Law and Gustafson' law. Design patterns for parallel programming (efficiency, simplicity, portability and scalability aspects). Decomposition methods by data and function, agglomeration, mappings. Parallel programming algorithms. Parallel sum and parallel prefix scan. Dense matrix algorithm. MapReduce as algorithmic framework. Sorting and search algorithms. Numerical methods. Discrete Optimization and Dynamic Programming with parallelization. Parallel programming fundamentals in practice, processes, thread management. Threading libraries: implicit (OpenMP) and explicit thread management (Windows and .NET framework threads), synchronization methods (lock, mutex, semaphore) and signaling (barriers). Debugging, tracing in parallel environment. Parallel image processing techniques. Dataparallel computing on GPGPU architectures. Lab: solving practical tasks.</p>			
Literature			
<p>A. Iványi: Parallel Algorithms, ELTE Eötvös Kiadó, Budapest, 2005 (in Hungarian, electronic notes) Zoltán Hernyák: Communication Foundation – Distributed Programming in Microsoft.NET Environment, Kempelen Farkas Hallgatói Információs Központ, 2011 (in Hungarian, electronic notes) A. Grama, A. Gupta, G. Karypis, V. Kumar: Introduction to Parallel Computing, 2nd edition Addison-Wesley, 2003 Joseph Albahari - Ben Albahari: C# 4.0 in a Nutshell, O'Reilly, 2010 J. Albahari: Threading in C# (electronic notes)</p>			