

Óbuda University John von Neumann Faculty of Informatics		Institute of Software Engineering	
Name and code: Parallel Programming (NIXPEREMNE)		Credits: 5	
<i>Computer Science MSc szak</i>		<i>Daytime tagozat 2022/23 tanév I. félév</i>	
Subject lecturers: Dániel Kiss, Dr. habil. Miklós Kozlovsky			
Prerequisites: (kóddal)			
Weekly hours:		Lecture: 2	Seminar: 0
Way of assessment:		Lab. hours: 2	Consultation: 0
Course description			
<i>Goal:</i> The aim of the lecture is to deepen the knowledge of the students, regarding the design methods and questions for parallel computational systems, and the required programming skills.			
<i>Course description:</i> Students will learn, and obtain practical techniques used in parallel programming, such as thread handling, communication between threads, and synchronization. The lecture will give an additional overview of different programming variants of distributed systems.			

Lecture schedule						
Education week	Topic					
1	Fundamentals of Parallel Programming. Efficiency.					
2	Parallel design. Granularity. Load balance. Processes in operating systems.					
3	Designing parallel algorithms. Multithreading, thread parallelism. Race condition.					
4	Synchronization. Dekker's algorithm and Peterson's algorithm. Critical Section. Mutual Exclusion.					
5	MPI #1					
6	MPI #2					
7	Lamport's "bakery" algorithm. Atomic operations. Semaphore. Deadlock.					
8	Classical problems I: dining philosophers, readers-writers.					
9	<i>Break</i>					
10	Classical problems II: cigarette smokers, barbershop. Monitor.					
11	Producer-consumer problem. Concurrent data structures. ABA problem.					
12	Master-worker pattern. Concurrent bag of jobs.					
13	Midterm exam.					
14	Retake of the midterm exam.					
Midterm requirements						
Attendance of lectures and lab sessions is compulsory. Students have to write a midterm exam on week 13 which is expected to be at least 50						
Midterm Test Scheduling						
Education week	Topic					
13	Midterm exam.					
14	Retake of the midterm exam.					
Midterm grade calculation methods						
By successfully completing the midterm exam (see above), a so-called signature can be obtained which is required to have the right to sit for the final exam. To get the signature, students must not miss more than 30						
Method of replacement						
In case of a missed or failed midterm exam, a retake exam is available on the last week. If the necessary 50						
Type of exam						
The final exam is a written test.						
Exam grade calculation methods						
If the grade calculated from the midterm exam is at least good (4), then this grade will be offered. In other cases, the grade is calculated from the final exam's result:						
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50-61						
62-73						
74-85						
86-100						
References						
Obligatory:						

Recommended:
Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar: Introduction to Parallel Computing, Addison Wesley, 2003
Mattson, Sanders, Massingill: Patterns for Parallel Programming, Pearson, 2005
Clay Breshears: The Art of Concurrency, O'Reilly, 2009
Others:
University Moodle System: https://elearning.uni-obuda.hu/main/