Program	Level	Second cycle
	Name of the program	Theoretical Computer Science

COURSE

Course title	**Parallel Computation and Optimization**			
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)
CS 537	I	Mandatory course	8	3+0+2
Lecturer				
Course Goals	The aim of the course is to provide knowledge and practical experience in the development of application software for processors that have resources for parallel computing. Efficient programming of such processors will require knowledge of parallel programming principles, models parallelism, communication model as well as limited resources processor.			
Learning Outcomes	Knowledge: Understanding and construction of parallel algorithms. Skills: Working with programming languages and parallel platforms calculation. Competencies: Solving problems using parallel methods calculations.			

COURSE CONTENT

- Performance measurement
- Parallel architectures
- Problems that can be solved using parallel programming
- Programming languages for parallel programming
- Program portability problems
- Operating system problems
- Tools for parallel programming
- Parallel algorithms
- Parallelization of sequential programs
- Strong scaling and Amdahl's law;
- Weak scaling and Gustafson's law

LITERATURE

Primary:

[1] P. Pacheco: "An Introduction to Parallel Programming", 1st edition, 2011.
[2] J. Sanders, E. Kandrot: "CUDA by Example", 1st edition, 2010.
[3] CUDA C++ Programming Guide, PG-02829-001_v11.1, October 2020.

Secondary:

[1] M. Herlihy, N. Shavit, V. Luchangco, M. Spear: "The Art of Multiprocessor Programming", 2nd edition, 2020.
[2] D. B. Kirk, W. W. Hwu: "Programming Massively Parallel Processors: A Hands-on Approach ", 3rd edition, 2016.
[3] W. Fokkink: "Distributed Algorithms: An Intuitive Approach", 2nd edition 2018.

STUDENT WORKLOAD (hours in a semester)

Lectures	45	Exercises	30	Individual work	125	T o t a l	200

GRADING			**REMARKS**
Criterion	Maximum points	Minimum points	
Midterm exams	22.5		
Attendance	10		
Lab exercises	45		
Final exam	22.5		
Total	100	55	