Program	Level	Third cycle
	Name of the program	SEE Doctoral Studies in Mathematical Science

COURSE

Course title	**Calculations of high performance**			
Course code	Semester	Course status	ECTS	Contact hours
CS 655	II	Elective course	10	30
Lecturer				
Course Goals	The main objective of the case is to familiarize yourself with the applications of calculating high performance (HPC) in mathematical disciplines. Students need to master knowledge of the concepts used for the current available and future hardware, as well as the standards of the accompanying stoftver. Planned that examples for all thematic units are processed on the relevant hardware, from one CPU, across several of them, to the CPU and GPU clusters.			

COURSE CONTENT

- Von-Neumann's computer concept
- Flynn's Taxiometry (SISD, SIMD, MISD, MIMD).
- Computer/processor network topologies.
- Competitiveness and correctness (data races, atomic operations, deadlock, live lock).
- Split memory, distributed memory, hybrid environments.
- Partitioning, communications, synchronization, data dependency, granularity.
- Restrictions and price of parallel programming.
- Acceleration, Amdahl's law, Gustavson's law.
- Multi-core processors

LITERATURE

[1] J. L. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann Publishers, 3rd edition, 2003.
[2] M. Herlihy and N. Shavit, The Art of Multiprocessor Programming. Morgan Kaufmann, 2008.
[3] T. Rauber and G. Runger, Parallel Programming: for Multicore and Cluster Systems, Springer, Berlin, 2010.

GRADING			**REMARKS**
Criterion	Maximum points	Minimum points	
Homeworks	20		
Project	40		
Final exam	40		
T o t a l	100	55	