Program	Level	First cycle		
	Name of the program	Theoretical Computer Science		
COURSE				
Course title	**Computer Architecture**			
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)
CS 285	IV	Elective course	5	2+0+2
Lecturer				
Course Goals	The course goals are to get acquainted with more advanced computer architectures that overcome the problems related to the classical Von Neumann computer architecture, which include various models of stream, parallel and multiprocessor computer architectures.			
Learning Outcomes	Upon completion of the module, students will be able to: 1. Understand the shortcomings of classical computer architectures; 2. Understand the basic concepts of stream and parallel architectures; 3. Understand the basic concepts of distributed computer systems; 4. Understand the application of parallel architectures to solve computationally demanding problems.			

COURSE CONTENT

- Classifications of computer architectures; SISD, MISD, SIMD and MIMD architectures;
- Quantitative principles of computer design;
- Architecture of instruction set; Stream structures; Hazards;
- Parallelism in single-processor computer systems; Instruction-level parallelism
- Overcoming bottlenecks between computer subsystems; Subsystem bandwidth balancing
- Compiler support in increasing parallelism at the instruction level; Hardware support in increasing instructional parallelism
- Pipeline and vector architecture of computer systems
- Memory hierarchy
- Parallel computer architectures; Multiprocessor architectures
- Design of parallel computer architectures; Networks for connecting system components
- Cache, coherence and consistency in distributed systems; Message exchange protocol; Clusters and grids
- Performances of parallel computers
- Data-driven computers
- Parallel computer architectures for specialized applications
- Comparative analysis of different types of computer architectures

LITERATURE

[1] A. Tanenbaum: "Structured Computer Organization (6h edition)", Pearson; 6th edition (August 4, 2012).
[2] L. Hennessy, D.A. Patterson, "Computer Architecture – A Quantitative Approach", 5th edition, Morgan Kaufmann; (September 30, 2011)
[3] D.A. Patterson, J.L. Hennessy, "Computer Organization and Design – The Hardware/Software Interface", Morgan Kaufmann; 4th edition (November 9, 2011)

STUDENT WORKLOAD (hours in a semester)

Lectures	30	Tutorial	30	Individual work	65	T o t a l	125

GRADING			**REMARKS**
Criterion	Maximum points	Minimum points	
Midterm exams	50		
Final exam	50		
T o t a l	100	55	