1.	Course Title	Computer Architecture and Organization
2.	Code	F18L1S003
3.	Study program	Software engineering and information systems
4.	Study Program Organizer	Faculty of Computer Science and Engineering
5.	Degree (first, second, third cycle)	first cycle
6.	Academic year / semester 1 / summer / mandatory	7. ECTS credits 6
8.	Teacher	Ph.D. Aleksandra Kanevche, full professor Marjan Gushev, full professor Ljupcho Antovski, associate professor Igor Mishkovski, associate professor Dejan Spasov, assistant professor Sasho Gramatikov, assistant professor Sashko Ristov, assistant professor Miroslav Mirchev, assistant professor Magdalena Kostoska, assistant professor Vladimir Zdraveski, assistant professor Biljana Stojkoska
9.	Course enrollment prerequisites	
10.	Course program goals (competencies): Understanding the main parts of computer architectures, internal organization, performance evaluation of individual parts and the computer system in whole.	
11.	Course program content: (1) Introduction to Computer Systems. Overview of computer architectures and computational structures. Capacity and performance of computer systems. (2) Number systems. Machine representation of numbers. Accessories. SM, RC, DC systems Arithmetic algorithms. Codes. Hamming distance and codes. Compression. Floating point numbers. (2) Boolean algebra, switching functions, logical gates, combinational circuits, minimization of circuits. Analysis and design of frequency circuits. (1) Organization of the arithmetic-logical device. Computer Arithmetic. Types of addressing. Translating and launching a program. Instruction formats. MIPS. Processing instructions and operations. (2) Processor, basic implementation, control unit, operations over data paths. (1) Flow-flow techniques, front-view, multifunctional units. Parallelism. Conflicts. Termination, software, hardware (2) Memory hierarchy. Cache memory. Virtual memory. TLB (1) Using the main memory. Types of RAM. Parameters of memory systems. Typical memory organizations. (1) Storage and other I / O devices. Drives, flash memory (1) Multi-core, multiprocessor cluster systems, multi-threaded work, superscalarity, types of parallelism, GPUs, network topologies for multi-processor systems	
12.	Learning methods: Lectures using presentations, interactive lectures, exercises (using equipment and software	

	packages), teamwork, case studies, invited guest lecturers, independent preparation and defense of a project assignment and seminar work.			
13.	Total available time		6 ECTS x 30 hours = 180 hours	
14.	Distribution of the available time		30 + 45 + 15 + 15 + 75 = 180 hours	
15.	Teaching activity forms	15.1.	Lectures – theoretical teaching	30 hours
		15.2.	Exercises (laboratory, auditory), seminar papers, teamwork	45 hours
16.	Other activity forms	16.1.	Project Tasks	15 hours
		16.2.	Independent Learning Tasks	15 hours
		16.3.	Home learning	75 hours
17.	Assessment methodology			
	17.1.	Tests		10 points
	17.2.	Seminar paper/project (presentation: written and oral)		10 points
	17.3.	Activity and learning		10 points
	17.4.	Final exam		70 points
18.	Assessment criteria (points/grade)		up to 50 points	5 (five) (F)
			51 to 60 points	6 (six) (E)
			61 to 70 points	7 (seven) (D)
			71 to 80 points	8 (eight) (C)
			81 to 90 points	9 (nine) (B)
			91 to 100 points	10 (ten) (A)
19.	Course completion and final exam requirements		Realized activities 15.1 and 15.2	
20.	Teaching Language		Macedonian and English	
21.	Teaching quality evaluation method		Internal evaluation mechanisms and questionnaires	
22.	Course Material			
	22.1.	Mandatory course material		

	No.	Author	Title	Publisher	Year
	1	Патерсон, Хенеси	Компјутерска организација и дизајн	Просветно дело, (Morgan Kaufmann)	2011
	2	Hennessy & Patterson	Computer Architecture: A Quantitative Approach 5th Edition	Morgan Kaufmann	2011
	3	Hennessy & Patterson	Computer Organization and Design MIPS Edition, 5th Edition: The Hardware/Software Interface	Morgan Kaufmann	2013

22.2. Additional course material

No.	Author	Title	Publisher	Year