

1.	Course title	Embedded computer systems		
2.	Course code	CSES604		
3.	Study program	IKI, KNI		
4.	Unit offering the course	FCSE		
5.	Undergraduate/postgraduate/PhD	Undergraduate		
6.	Year/semester 3/summer/elective	7. ECTS: 6		
8.	Teacher(s)	Prof. Dimitar Trajanov, Prof. Vladimir Trajkovic, Assist. Prof. Sonja Filiposka, Assist. Prof. Igor Mishkovski		
9.	Course prerequisites	None		
10.	Goals (competences): Understanding different types of microcontrollers and embedded computer systems application, real-time systems and low-energy computing, embedded operating systems and their programming, designing small personal devices, network connection to existing network architecture.			
11.	Course content: History of embedded systems. Embedded systems overview. Software and hardware computer components. Software components and software for embedded computer components. Off-the-shelf software components. COTS paradigm. Software pattern design and frameworks. Basics of limited resources programming. Resource types that can influence the design of the application solution in embedded computer components. Programming principles with limited computational capability and memory. Programming real-time systems. Development tools for designing software solutions for embedded computer components. User interfaces, security and interoperability for the embedded computer components. Basic programming of mobile components: requirements, approaches and applications. How network standards and protocol influence the design of application solutions for mobile computer components. Operating systems for mobile devices and components. Development tools for software solutions for mobile computer components. Data storage for small devices. RFID and similar technologies. Biometrics and biometric embedded computer systems.			
12.	Teaching methods: Lectures supported by slide presentations, interactive lectures, trainings (using lab equipment and software packages), team work, case studies, invited guests and lectures, individual practical assignments presentations, seminar paper, e-learning (forums, consultations).			
13.	Total available time	6 ECTS x 30 h = 180 h		
14.	Distribution of the available time	30 + 15 + 135 = 180 h		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	45 hours
16.	Other activities	16.1.	Project work	30 hours
		16.2.	Self study	25 hours
		16.3.	Home work	50 hours

17.	Grading					
	17.1.	Tests			70 points	
	17.2.	Seminar work/project (written or oral presentation)			20 points	
	17.3.	Active participation			10 points	
18.	Grading criteria			to 49 points	5 (five) (F)	
				from 50 to 60 points	6 (six) (E)	
				from 61 to 70 points	7 (seven) (D)	
				from 71 to 80 points	8 (eight) (C)	
				from 81 to 90 points	9 (nine) (B)	
			from 91 to 100 points	10 (ten) (A)		
19.	Final exam prerequisites			Successful completion of activities 15.1 and 15.2		
20.	Course language			Macedonian and English		
21.	Quality assurance methods			Internal evaluation mechanisms supported by student polls		
22.	Literature					
	22.1.	Compulsory				
		No.	Authors	Title	Publisher	Year
		1.	W. Wolf	Computers as Components: Principles of Embedded Computer Systems Design	Morgan Kaufmann	2000
		2.	A .S. Berger	Embedded Systems Design: An Introduction to Processes, Tools & Techniques	CMP Books	2001
		3.	Jonathan Valvano	Embedded Systems: Real-Time Operating Systems for the Arm® Cortex(TM)-M3	CreateSpace Independent Publishing Platform	2012
		Additional				
	22.2.	No.	Authors	Title	Publisher	Year
		1.	Michael Pont	Embedded C	Addison Wesley	2002
		2.	Daryl Wilding-McBride	Java™ Development on PDAs: Building Applications for Pocket PC and Palm Devices	Addison Wesley	2003
3.		Craig Hollabaugh	Embedded Linux®: Hardware, Software, and Interfacing	Addison Wesley	2002	