

1.	Course title	Sensor networks		
2.	Course code	KMET-I-08		
3.	Study program	Computer networks and e-technologies		
4.	Unit offering the course	FCSE		
5.	Undergraduate/master/PhD	Master		
6.	Year/semester 1(2)/summer/elective	7. ECTS: 6		
8.	Teacher(s)	Assist. Prof. Igor Mishkovski, Assist. Prof. Lasko Basnarkov		
9.	Course prerequisites	None		
10.	Goals (competences): After successfully completing the course, the student is expected to be able to design a sensor network as well as develop software that is used in sensor networks environment.			
11.	Course content: Introduction to sensor networks. Wireless sensor networks. Physical layer: practical implementation of wireless sensor network physical layer with multiple sensors. Data layer: medium access control techniques. Network layer: examples of network design, designing a wireless sensor network using the clustered tree architecture. Practical implementation problems. Sensor/actuator interfaces. Time based accuracy and average power consumption. Power management, power sources. Loads, regulators and convertors. Power management strategies. Antennas and RF performance definition. Wireless sensor networks standards IEEE 802.15.4 WPAN low data rate standards. ZigBee Alliance, IEEE 1451.5 standard used for interfacing with a wireless smart sensor/actuator.			
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 hours = 180 hours		
14.	Distribution of the available time	30 + 15 + 135 = 180 hours		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	15 hours
16.	Other activities	16.1.	Project work	60 hours
		16.2.	Self study	25 hours
		16.3.	Home work	50 hours
17.	Grading			
	17.1.	Tests		45 points
	17.2.	Seminar work/project (written or oral presentation)		45 points
	17.3.	Active participation		10 points
18.	Grading criteria		to 59 points	5 (five) (F)
			from 60 to 68 points	6 (six) (E)

		from 69 to 76 points	7 (seven) (D)			
		from 77 to 84 points	8 (eight) (C)			
		from 85 to 92 points	9 (nine) (B)			
		from 93 to 100 points	10 (ten) (A)			
19.	Final exam prerequisites	Successfully completed activities 15.1 and 15.2				
20.	Course language	Macedonian and English				
21.	Quality assurance methods	Internal evaluation and student questionnaires				
22.	Literature					
	22.1.	Compulsory				
		No.	Authors	Title	Publisher	Year
		1.	Waltenegus Dargie, Christian Poellabauer	Fundamentals of Wireless Sensor Networks: Theory and Practice (Wireless Communications and Mobile Computing)	Wiley	2010
		2.	Ian F. Akyildiz, Mehmet Can Vuran	Wireless Sensor Networks (Advanced Texts in Communications and Networking)	Wiley	2010
	3.		Selected papers			
	22.2.	Additional				
		No.	Authors	Title	Publisher	Year
		1.	Carlos de Morais Cordeiro, Dharma Prakash Agrawal	Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition)	World Scientific Publishing Company; 2 edition	2011
		2.	Edgar H., Jr. Callaway	Wireless Sensor Networks: Architectures & Protocols	CRC Press	2003
3.	Anna Hac	Wireless Sensor Network Designs	Wiley	2003		