1.	Course Title	Multimedia Networks
2.	Code	F18L3W134
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 4 / winter / mandatory	7. ECTS credits 6
8.	Teacher	assistant professor Sasho Gramatikov
9.	Course enrollment prerequisites	Компјутерски мрежи или Компјутерски мрежи и безбедност
10.	Course program goals (competencies): The main goals of the course is to introduce the students to the properties of multimedia contents which are essential for their distribution, the mechanisms for distribution of multimedia from perspective of the network protocols, the problems that might occur during their delivery, the solutions for improving the quality of service and the various content distribution platforms. The students will get skills to to analyse the multimedia contents, adapt them for distribution in various network conditions and host them on dedicated video servers.	
11.	Course program content: Introduction to multimedia contents and systems. Codecs and containers. Processing of multimedia contents for distribution. Distribution of multimedia contents over IP. Distribution of MPEG streams. IP multicast. Distribution of multimedia contents over UDP, TCP, RTP, RTCP, SDP, RTSP and RTMP. Progressive and adaptive streaming. Adaptation of multimedia contents for adaptive streaming. Voice over IP. Quality of service. Caching of multimedia contents. Content Delivery Networks. IPTV. P2P. Platforms for video distributions. Home solutions for multimedia distribution.	
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	0 points
	17.2.	Seminar paper/project (presentation: written and oral)	35 points
	17.3.	Activity and learning	35 points
	17.4.	Final exam	30 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	Hans W. Barz	Multimedia networks: Protocols, design and applications	Wiley	2016
2	Wes Simpson	IPTV and Internet video	Focal Press	2007
3	Wes Simpson	Video over IP	Focal Press	2008

22.2. Additional course material

No.	Author	Title	Publisher	Year