

1.	Course title	<b>Information Theory 2</b>		
2.	Course code	KK-I-05		
3.	Study program	<b>Coding and cryptography</b>		
4.	Unit offering the course	<b>FCSE</b>		
5.	Undergraduate/master/PhD	<b>Master</b>		
6.	Year/semester 1(2)/winter/elective	7. ECTS: <b>6</b>		
8.	Teacher(s)	prof. d-r Verica Bakeva doc. d-r Dejan Spasov		
9.	Course prerequisites	None		
10.	Goals (competences): Introducing the mathematical model of communication channel.			
11.	<p>Course content:</p> <p>Communication system. Entropy. Information. Data compression. Asymptotic Equipartition Property (AEP) for independent random variables. Shannon theorem. Noiseless Coding. Symbolic codes. Problem of unique decoding. Prefix codes (or instantaneous codes). Kraft inequality. Theorem for noiseless decoding. Construction of optimal codes.</p> <p>Communication through noise channel (Communication channel. Models of communication channel. Capacity of communication channel. Discrete channel without memory)</p> <p>Information source: Markov chain. Information source. Regular Markov chain. Source entropy. Approximation of general information source with finite order source. Theorem of Shannon-McMillan (Asymptotic Equipartition Property (AEP)).</p> <p>Discrete channel with memory: Model of discrete channel with memory. Finite state channel. Capacity of general discrete channel. Coding theorem for finite state regular channels.</p> <p>Continuous channel: Entropy of continuous random variables. Entropy of Gaussian random variables. AEP for continuous random variables. Types of continuous channels. Gauss channel. Coding theorem for discrete-time Gaussian channel.</p>			
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+30+40+40+40 = 180 hours		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	30 hours
16.	Other activities	16.1.	Project work	40 hours
		16.2.	Self study	40 hours

		16.3.	Home work		40 hours	
17.	Grading					
	17.1.	Tests			50 points	
	17.2.	Seminar work/project (written or oral presentation)			30 points	
	17.3.	Active participation			20 points	
18.	Grading criteria		to 50 points		5 (five) (F)	
			from 51 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		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.	Thomas M. Cover, Joy A. Thomas	Elements of Information Theory	John Wiley & Sons, Inc	2006
		2.	R.Ash	Information Theory	Dover Publication, Inc.	1990
		3.				
	22.2.	Additional				
		No.	Authors	Title	Publisher	Year
		1.				
2.						
3.						