1.	Course		*Complex Network Analysis and Evolution*	
2.	Code		KNI_E32	
3.	Study programme		Computer Science and Engineering PhD study programme	
4.	Study programme organized by		FCSE	
5.	Cycle		Third – PhD	
6.	Academic year / semester winter/summer/elective		7. ECTS credits 7,5	
8.	Teacher		Prof. d-r Igor Mishkovski	
9.	Prerequisites		None	
10.	Course programme goals (competences): The students will be able to analyze, manage, support and secure real complex networks. The students will have an in depth understanding of the ways to apply the basic theoretical and practical tools for social, economical and technological structures analysis, as well as analysis of their interconnections and composite behavior. They can asses the individual or small group behavior as a part of the complex network, like the Internet and global economy.			
11.	Course syllabus: Structure and evolution of networks. Network representation models. Evaluation of the structure influence on dynamic network processes. Network optimization, strategic network formations, searching. Diffusion, opinion formation, consensus, coordination and cooperation. Network analysis tools applications on real life problems. Real life case studies analysis: how social network connectivity can contribute to gain/loss. Using game theory for Internet routing analysis, path networks. Markets and strategic market interaction. Network dynamics (population models). Aggregate behavior. Software defined networking. Data plane and control plane network management. Network security and support with a special attention to communication networks.			
12.	Teaching methods: Classes supported with slide presentations, interactive teaching, lab equipment and other software packages, teamwork, case studies, invited guest lecturers, presentations of project works, e-learning materials, forums and consultations.			
13.	Total fund of work hours		7,5 EKTC x 30 h = 225 h	
14.	Available hours distribution		45+30+150 = 225	
15.	Teaching activities	15.1.	Theoretical classes	45 h
		15.2.	Practical classes (labs, exercises), seminars, team work	30 h
16.	Other activities	16.1.	Project tasks	50 h
		16.2.	Self study	50 h
		16.3.	Homework	50 h
17.	Grading			
	17.1.	Tests		40 points
	17.2.	Seminar work/ project (presentation: written and oral)		50 points
	17.3.	Active participation		10 points
18.	Grading criteria (points/grade)		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.	Conditions for attending the final exam		Successful completion of activities 15.1 and 15.2		
20.	Language		Macedonian or English		
21.	Quality assessment		Internal evaluation and student pools		
22.	Literature				
	22.1.	Compulsory			
		No.	Author	Title	Publisher	Year
		1.	Malcolm Gladwell	The Tipping Point	Little Brown & Company	2000
		2.	D. Easley and J. Kleinberg	Networks, Crowds, and Markets: Reasoning About a Highly Connected World	Cambridge University Press	2010
		3.	Fei Hu	Network Innovation through OpenFlow and SDN: Principles and Design	Chapman and Hall/CRC	2013
	22.2.	Additional				
		No.	Author	Title	Publisher	Year
		1.				
		2.				
		3.				