1.	Course	**Critical Systems Engineering**			
2.	Code	**INF-C22**			
3.	Study programme	Informatics			
4.	Study programme organized by	Faulty of Computer Science and Engineering			
5.	Cycle	Third - PhD			
6.	Academic year / semester winter/summer/elective	first/second	7.	ECTS credits	7,5
8.	Teacher	Prof. Boro Jakimovski, PhD, Prof. Anastas Mishev, PhD, Prof. Katerina Zdravkova, PhD.			
9.	Prerequisites	None			
10.	Course programme goals (competences): This course aims to introduce and critically analyze critical systems (CS). Requirements for the engineering of CSs will be introduced and role of formal approaches in the CS life cycle will be explored. Upon successful completion of the course, the student will be able to: critically evaluate the current taxonomies of CSs including the international standards; critically evaluate of formal methods in the light of CS life cycle, appreciate the essential issues of time CS, both at the specification and design stages; critically evaluate the temporal logic for the engineering and re-engineering of CSs.				
11.	Course syllabus: Classification and analysis: examples, analysis, taxonomy, standardization efforts; Time-critical systems: what are they; technical issues (design and architecture, specification, scheduling, reliability and dependability); Role of formal approaches: software in CSs (and real-time); goals and objectives; assurance; formal approaches in CSs life cycle; examples of formal approaches (model-based, logicbased, process algebras, refinement); Refinement, abstraction, and evolution: rationale and model (why, what is needed, computational model); Interval temporal logic (syntax, semantics, tool; refinement calculus; abstraction calculus; evolution.				
12.	Teaching methods: Classes supported with slide presentations, interactive teaching, teamwork, case studies, invited guest lecturers, presentations of project works, e-learning materials, forums and tutorials				
13.	Total fund of work hours	7,5 EKTC x 30 h = 225 h			
14.	Available hours distribution	45 + 30 + 50 + 50 + 50 = 225			
15.	Teaching activities	15.1.	Theoretical classes	45 h	
		15.2.	Seminars, team work	30 h	
16.	Other activities	16.1.	Project tasks	50 h	
		16.2.	Individual assignments	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.	J. Jürjens, B. Livshits, R. Scandariato (editors)	5th International Symposium on Engineering Secure Software and Systems (ESSoS 2013)	Springer LNSC	2013
		2.	Darren Cofer. Alessandro Fantechi (Eds.)	Formal Methods for Industrial Critical Systems	Springer LNSC	2008
		3.				
	22.2.	Additional				
		No.	Author	Title	Publisher	Year
		1.	Cooling, Jim	Software Engineering for Real-Time Systems	Barnes and Noble	2002
		2.				
		3.				