1.	Course Title	Machine learning		
2.	Code	F18L3S036		
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 3 / summer / optional	7. ECTS credits 6		
8.	Teacher	Ph.D. Aleksandra Kanevche, full professor Ljupcho Kocarev, assistant professor Miroslav Mirchev		
9.	Course enrollment prerequisites	Веројатност и статистика или Бизнис статистика		
10.	Course program goals (competencies): The aim of the course is for the students to become familiar with the basics of modern machine learning techniques. Upon completion of the course, candidates will have deeper knowledge of advanced technologies and methods of machine learning; they will be able to understand, analyze and formulate general problems in the field of machine learning; they can successfully apply algorithms for machine learning in solving real problems; will be able to conceptualize, analyze, realize and evaluate the performance of a machine learning system.			
11.	Course program content: Introduction to machine learning. Linear regression with one and more variables. Logistic regression, representation of hypothesis, cost functions, error evaluation, model selection and validation. Neural networks, regulation in neural networks. Graphical models, Bayes network, Markov random fields. Kernel methods, support vector machines. Unsupervised learning and reinforsement learning. Deep Learning.			
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	10 points
	17.2.	Seminar paper/project (presentation: written and oral)	10 points
	17.3.	Activity and learning	10 points
	17.4.	Final exam	70 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	Christopher M. Bishop	Pattern Recognition and Machine Learning	Springer	2006

22.2. Additional course material

No.	Author	Title	Publisher	Year