

1.	Course Title	Algorithms and Data Structures
2.	Code	F18L2W001
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 2 / winter / mandatory	7. ECTS credits 6
8.	Teacher	full professor Vladimir Trajkovikj, full professor Ana Madevska Bogdanova, associate professor Slobodan Kalajdzhiski, associate professor Anastas Mishev, assistant professor Hristina Mihajloska, assistant professor Magdalena Kostoska, assistant professor Biljana Stojkoska
9.	Course enrollment prerequisites	Објектно-ориентирано програмирање
10.	<p>Course program goals (competencies):</p> <p>Introduction to basic data structures and algorithms needed to understand different technologies (e.g. databases, application development frameworks). Students will be able to develop algorithms using f data structures such are: lists, trees, graphs, as well as searching indexes. Student will be able to implement different algorithms' archetypes which are used in implementation of many software solutions.</p>	
11.	<p>Course program content:</p> <p>(1) Introduction to data structures (1) Algorithm analyses and complexity (2) Data representation using fundamental data structures (arrays and lists) (2) Introduction to algorithms and algorithms' design techniques (brute force, greedy, divide and conquer, dynamic programming...) (1) One dimensional data structures (stack, queue) (1) Sorting algorithms (1) HASH structures (2) Hierarchical data structures - trees (2) Graphs</p>	
12.	<p>Learning methods:</p> <p>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.</p>	

13.	Total available time	6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time	30 + 60 + 10 + 10 + 70 = 180 hours		
15.	Teaching activity forms	15.1.	Lectures – theoretical teaching	30 hours
		15.2.	Exercises (laboratory, auditory), seminar papers, teamwork	60 hours
16.	Other activity forms	16.1.	Project Tasks	10 hours
		16.2.	Independent Learning Tasks	10 hours
		16.3.	Home learning	70 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	Steven S. Skiena	The Algorithm Design Manual	Springer	2008
2	Robert Sedgewick and Kevin Wayne	Algorithms	Addison-Wesley Professional	2011
3	Jon Kleinberg, Éva Tardos	Algorithm Design	Addison Wesley	2005
4	Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft	Data structures and algorithms	Addison Wesley	1983
5	Donald Knuth	The Art of Computer Programming	Addison Wesley	2002
22.2. Additional course material				
No.	Author	Title	Publisher	Year