1.	Course title	**Algorithms and Data Structures**		
2.	Course code	**CSEW301**		
3.	Study program			
4.	Unit offering the course	**FCSE**		
5.	Undergraduate/postgraduate/PhD	**Undergraduate**		
6.	Year/semester	II/3. ECTS: **6**		
8.	Teacher(s)	Asoc. prof. Vladimir Trajkovik, PhD, Asoc. Prof. Ana Madevska Bogdanova, PhD, Asoc Prof. Dejan Gjorgevikj, PhD, Asist. Prof. Vesna Dimitrova, PhD, Asist. Prof. Slobodan Kalajdziski, PhD, Asist. Prof. Anastas Mishev, PhD, Asist. Prof. Boro Jakimovski, PhD, Aist. Prof. Igor Trajkovski, PhD, Asist. Prof. Gjorgji Madzarov, PhD		
9.	Course prerequisites	Structured programming		
10.	Goals (competences): Introduction to basic data structures and algorithms paradigms. The student will be educated to understand and develop structures using linear lists, trees, graphs and search indexes. Student will also be educated to implement different algorithmic archetypes used in majority of software solutions.			
11.	Course content: Introduction to static, dynamic data structures and algorithms, algorithms features (efficiency, correctness, validity). Algorithms comparison using Random Access Machine, Asymptotic notations. Linear Data Structures. Hashing. Stack: definitions and related algorithms. Linked Lists: types and related algorithms. Queues: definitions and related algorithms. Hierarchical Data Structures. Trees: definitions, applications and related algorithms. Binary Searching Trees: definitions and algorithms. Binary Search and related sorting techniques. Sequential Searching. Basic Sorting Algorithms. Algorithms Archetypes: Greedy Algorithms, Divide and Conquer Algorithms, Dynamic Programming, Algorithms using Random Numbers, Backtracking Algorithms. Introduction to Planar Data Structures, Graphs: definitions, and representations. Basic Graphs related algorithms: Topological Sorting, Breath First Search, Depth First Search and others)			
12.	Teaching methods: Lectures supported by presentations with slides, interactive lectures, exercises, team work, case studies, invited guest lecturers, preparation and defence of home works, learning in an e-environment (forums, consultations).			
13.	Total available time	6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time	30 + 60 + 0 + 40+ 50 = 180 hours		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	60 hours
16.	Other activities	16.1.	Project work	0 hours
		16.2.	Self study	40 hours
		16.3.	Home work	50 hours

17.	Grading		
	17.1.	Tests	65 points
	17.2.	Seminar work/project (written or oral presentation)	0 points
	17.3.	Active participation	35 points
18.	Grading criteria	up 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	Realized activities 15.1 and 15.2	
20.	Course language	Macedonian and English	
21.	Quality assurance methods	Internal evaluations and surveys	

22. Literature

22.1. Compulsory

No.	Authors	Title	Publisher	Year
1.	Steven S. Skiena	The Algorithm Design Manual	Springer	2008
2.	Robert Sedgewick and Kevin Wayne	Algorithms, 4th Edition	Addison-Wesley Professional	2011
3.	Vladimir Trajkovik	Algorithms and Data Structures (in Macedonian)	FCSE internal educational material	2010

22.2. Mandatory

No.	Authors	Title	Publisher	Year
1.	Jon Kleinberg, Éva Tardos	Algorithm Design	Addison Wesley	2005
2.	Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft	Data Structures and Algorithms	Addison Wesley	1983
3.	Donald Knuth	The Art of Computer Programming	Addison Wesley	2002