

DESCRIPTION OF A STUDY COURSE – SYLLABUS

Title of a course	Algorithms and Data Structures				
Head of course	Associate Professor, PhD Alen Jakupović				
Study programme	Professional undergraduate study Telematics				
Status of a course	Obligatory				
Year of study	1.	Semester	II	ECTS credits	5
Teaching plan (L + E + S+ Pr)	2+2+0+0				
Goals of a course					
Acquire competencies to work with list data structures, row stack, tree, dictionary and set, and become familiar with basic sorting and search algorithms.					
Conditions for enrolling course					
No conditions					
Learning outcomes on a level of a study programme which includes course					
Outcome 4: Use computer principles and methods related to the architecture and organization of computers and computer networks. Outcome 5: Use computer principles and methods related to programming languages, databases, and operating systems. Outcome 6: Design and implement desktop, web and mobile computer applications and computer programs for microcomputers and microcontrollers, with or without a database. Outcome 10: Analyse and implement an information system in the field of telematics.					
Expected learning outcomes on a level of a course					
1. Apply data structures: list, row, stack, tree, dictionary, set 2. Describe sorting algorithms: bubble sort, selection sort, insertion sort, shell sort, merge sort and quick sort 3. Describe search algorithms: sequential search, block read, binary search, search tables 4. Describe algorithms using pseudocodes and program flow diagrams 5. Use a debugger in a computer program					
Content of a course					
Fields and vectors (syntax, semantics, multidimensional fields, development of container class); FIFO and LIFO (sleep awaiting, data arranging); Data structures for chain of characters (String, String Buffer/String tokenizer); Algorithms verification (correctness, static and dynamic finite, guarantee, verification rules, termination); Expenses and complexity (expenses account, effectiveness, comparison of algorithms, complexity classification); Recursion (divide and conquer – strategies, implementation and dynamic complexity of recursive algorithms); Chain lists (simple and double chain lists with and without empty initial and final elements, cyclic chain lists; entering, adapting and removing the elements on the list, complexity of operation on the list); Trees (structure and notions, searching, entering and removing nodes in a binary tree, formation of search trees, traversal, balancing, multiple tree); Elementary search engine (sequential search, binary search, interpolative search); Browsing of data given in an unpredictable order (deduction transformations, transition linking, chart).					
Teaching modes	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> auditory exercises <input checked="" type="checkbox"/> seminars and workshops <input type="checkbox"/> distance learning <input type="checkbox"/> field classes		<input checked="" type="checkbox"/> individual assignments <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> supervisor's work <input type="checkbox"/> other _____		
Comments					
Students' obligations					

Grading, evaluation and monitoring of students' work continuously during lectures and exams

Grading is based upon evaluation of course's learning outcomes' adoption. Grading is performed continuously during lectures and/or during exam, in compliance with the provisions of Regulation on the assessment of students.

Continuous check-up:

Outcomes	Written test	Project defense	Practical assignments	Threshold	Max
Outcome 1	10 %	10 %	45 %	32,5 %	65 %
Outcome 2	10 %			5 %	10 %
Outcome 3	10 %			5 %	10 %
Outcome 4		10 %		5 %	10 %
Outcome 5		5 %		2,5 %	5 %
Percentage of ECTS	1,5	1,25	2,25	-	-
Total	30 %	25 %	45 %	50 %	100 %

A student has passed the exam if he has acquired a percentage of credits for each learning outcome higher or equal to defined threshold.

Exam term:

Outcomes	Written exam	Oral exam	Max
Outcome 1	10 %	55 %	65 %
Outcome 2	10 %		10 %
Outcome 3	10 %	25 %	10 %
Outcome 4		10 %	10 %
Outcome 5		5 %	5 %
Percentage of ECTS	1,5	3,5	-
Total	30 %	70 %	100 %

A student has passed the exam if he has acquired a percentage of credits for each learning outcome higher or equal to defined threshold.

Grading:

A student has passed the exam if he has acquired at least 50% of anticipated credits of a specific learning outcome.

If a student has passed learning outcomes of all courses, the accomplished credits (percentages) of all passed learning outcomes are being added, while the final grade is defined upon following table:

Range of credits (percentages)	Numerical grade	ECTS grade
90,00 – 100,00	Excellent (5)	A
75,00 – 89,99	Very good (4)	B
60,00 – 74,99	Good (3)	C
50,00 – 59,99	Sufficient (2)	D
0,00 – 49,99	Insufficient (1)	F

Obligatory literature

1. Authorized Lectures

Additional literature

1. McConnell S.: Cod Complete, Microsoft Press, 2nd edition, 2004.
2. Herbert S. W., Algorithms and Complexity, 2nd edition, AK Peters, 2002.
(<http://www.math.upenn.edu/~wilf/AlgoComp.pdf>)
3. Bruce Eckel, "Thinking in C++", Volume 1, 2nd Edition
(<http://www.planetpdf.com/developer/article.asp?ContentID=6634>)
4. Weiss, "Data Structures and Algorithm Analysis in C", Addison Wesley, 1997

5. Horowitz & Sahni, "Fundamentals of Computer Algorithms", Pitman, London, 1995

