Subject code	Credits
INF2001	4

Title

ALGORITMò ANALIZĀ

Title in English

ANALYSIS OF ALGORITHMS

Subject goal and annotation

Course examines algorithms that are used as building blocks for bigger algorithm construction, graph theory and algorithms on graphs, algorithm complexity, fnite automata theory, Turing machine and universal Turing machine and their application for modeling of computational processes.

Prerequisites

Undergraduate courses: Mathematics, Programming technologies, .NET data structures

Relationship between the learning outcomes of the Programme and learning outcomes of the subject

Learning outcomes of the Programme	Learning outcomes of the subject	Criteria for measuring the achievement of learning outcomes
3. Knowledge of basic and advanced computer science and its application	Knowledge and understanding of graph theory, algorithm complexity and finite automata.	Student demonstrates the ability to write program code in usual programming language when having pseudo-code of the algorithm for the task provided.
7. Formalization and specification of real-world problems, and ability to describe them at an abstract level 8. Perform interdisciplinary research and development in Internet systems area, apply results in practical applications.	Ability to use graph theory algorithms and finite automata when solving practical problems.	Student demonstrates skills in using graph algorithms and finite automata in social network context and process modelling.
9. Perform interdisciplinary research and development/creation in multimedia area, apply results in practical applications.	Ability to use graph theory algorithms in multimedia area, to compute their complexity and to distinguish brute force algorithms from the others.	Student demonstrates the ability to use simple and more complicated algorithms in multimedia area and to evaluate their level of complexity.

Subject content

	Lecture topics and contents	Hours
1.	Graphs and their visualization. Pseudo-code of algorithms and its interpretation.	3
2.	Width-first and depth-first search in graphs.	3
3.	Paths and spanning trees in graphs. Shortest paths and shortest spanning trees.	3
4.	Euler and Hamilton cycles in graphs. Other graph theory problems.	6
5.	Complexity of algorithms. Complexity of graph problems.	3
6.	Brute force problemsôcomplexity assessment. Complexity of recurrent algorithms.	3
7.	P, NP and NP-Complete complexity classes.	3
8.	Finite automata and computational process modelling	3
9.	Turing machine and its usage incomputational process modelling	3
	Total	**30**

Practical work contents

Three groups of practical problems. All problems should be presented and described.
1. Search algorithms in a graph.

2. Sort algorithms in a graph, their complexity. 3. Brute force algorithms, their complexity.

Evaluation of study results

Final written exam (50%), mid-term written exam (20%), and assessments of laboratory (practical) work (30%).

Distribution of subject study hours

Lectures	30
Laboratory work	30
Individual studies (including studies in groups, preparation for the mid-term and final exams)	56
Total	**116**

Recommended literature

No	Author and name	Number of copies available		
		in the Library of VMU	*in specialized publication collections at VMU*	*in other libraries*
Main literature				
1.	K.Plukas, E.Maļ ikānas, B.Jaraģiĺ nienā, I.Mikuckienā. Taikomoji diskreļ ioji matematika, Technologija, 2002	5	3	
Additional literature				
1.	T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein. Introduction to Algorithms, MIT Press, 2002			
2.	T.L. Booth. Sequential Machines and Automata Theory, John Willey & Sons, 1967			

Subject prepared and coordinated by

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