

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)						
Predmet:		Algoritmi in podatkovne strukture 1				
Course title:		Algorithms and data structures 1				
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year	Semester Semester	
Interdisciplinarni univerzitetni študijski program Računalništvo in matematika		ni smeri		2	prvi	
Interdisciplinary first cycle academic study programme Computer Science and Mathematics		none		2	first	
Vrsta predmeta / Course type				obvezni / compulsory		
Univerzitetna koda predmeta / University course code:				63279		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		30			105	6
Nosilec predmeta / Lecturer:				prof. dr. Igor Kononenko		
Jeziki / Languages:		Predavanja / Lectures:		slovenski / Slovene		
		Vaje / Tutorial:		slovenski / Slovene		
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Vpis v letnik študija.				Enrolment in the programme.		
Vsebina:				Content (Syllabus outline):		

predavanja:

Iteracija in rekurzija

Reševanje problemov in algoritmi

Analiza časovne zahtevnosti algoritmov

Abstraktni podatkovni tip, ADT seznam

Osnovni abstraktni podatkovni tipi: množica, vrsta, sklad, preslikava

Zgoščene tabele

Abstraktni podatkovni tip drevo, primer: Izrazna drevesa

Abstraktni podatkovni tip slovar, Iskalna drevesa: binarna, rdeče-črna

Iskalna drevesa: AVL, B-drevesa

Abstraktna podatkovna tipa prioriteta vrsta (kopica) disjunktne množice

Abstraktna podatkovna tipa graf in usmerjeni graf

Iskanje najdaljših poti z dinamičnim programiranjem (kritična pot)

Iskanje najkrajših poti v usmerjenem grafu (algoritem Dijkstra)

Minimalno vpeto drevo v neusmerjenem grafu, Primov in Kruskalov algoritem.

Dokazovanje parcialne in totalne pravilnosti programov

vaje:

Na vajah bodo študenti utrjevali snov, ki so jo

Lectures:

Iteration and recursion

Problem solving and algorithms

Analysing time-complexity of algorithms

Abstract data type, ADT list

Basic abstract data types: set, queue, stack, mapping

Hash tables

Abstract data type tree, example: expression trees

Abstract data type dictionary, search trees: binary, red-black

Search trees: AVL, B-trees

Abstract data type priority queue (heap) and disjunctive sets

Abstract data types graph and directed graph (digraph)

Searching for longest paths with dynamic programming (critical path)

Searching for shortest paths in directed graphs (algorithm Dijkstra)

Minimum spanning tree in undirected graphs, Prim and Kruskal algorithms.

Verification of partial and total program correctness

tutorials:

Practical applications of the knowledge gained through lectures. The emphasis is on the

<p>obravnavali na predavanjih, tako da jo bodo uporabili pri reševanju praktičnih problemov. Pri tem bodo poudarki na samostojnem delu študentov ob pomoči asistentov. Na vajah bodo študenti implementirali več manjših programov (tudi kot domače naloge) ter obsežnejše programe v obliki seminarских nalog, ki jih bodo zagovarjali na vajah in s tem dobili oceno iz vaj.</p> <p>domače naloge:</p> <p>Namen domačih nalog je ponuditi študentom priložnost za reševanje preprostejših problemov s samostojnim razvojem krajših programov in jih s tem spodbuditi k sprotnemu študiju.</p>	<p>autonomous work of students with the help of assistants. During tutorials (as well at home work), students will implement several short programs and will get grades for their presentation of seminar works.</p> <p>Home works:</p> <p>The purpose of home works is to offer each student the opportunity to autonomously develop short programs and to encourage them for continuous study.</p>
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Temeljni literatura in viri / Readings:

<p>I. Kononenko in sod.: Programiranje in algoritmi, Založba FE in FRI, 2008.</p> <p>Pomožna literatura:</p> <p>I. Kononenko in M. Robnik-Šikonja: Algoritmi in podatkovne strukture 1, Založba FE in FRI, 2003.</p> <p>A.V.Aho, J.E.Hopcroft, J.D.Ullman: Data Structures and Algorithms, Addison Wesley, 1983.</p> <p>Thomas H. Cormen, Stein Clifford, Charles E. Leiserson, Robert L. Rivest: Introduction to Algorithms, second edition. The MIT Press, 2001.</p>
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Cilji in kompetence:

<p>Cilj predmeta je spoznavanje osnovnih principov načrtovanja in analize algoritmov na osnovnih in dinamičnih podatkovnih strukturah.</p> <p>Kompetence:</p> <p>Zmožnost kritičnega, analitičnega in sintetičnega razmišljanja. Zmožnost razumevanja in reševanja profesionalnih problemov iz računalništva in informatike. .).</p>
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Objectives and competences:

<p>The goal of the course is to acquiring the basic principles of design and analysis of algorithms and basic and dynamic data structures.</p> <p>Competences:</p> <p>Developing skills in critical, analytical and synthetic thinking. The ability to understand and solve professional challenges in computer and information science. The ability to apply acquired knowledge in independent work for</p>
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Zmožnost uporabiti pridobljenega znanja za reševanje tehničnih in znanstvenih problemov v računalništvu in informatiki, zmožnost nadgrajevanja pridobljenega znanja. Osnovne veščine iz računalništva in informatike, ki vključujejo teoretične veščine, praktično znanje in veščine, ki so bistvene za področje računalništva in informatike. . Osnovne veščine iz računalništva in informatike, ki omogočajo nadaljevanje študija na 2. stopnji.

solving technical and scientific problems in computer and information science, the ability to upgrade acquired knowledge.

Basic skills in computer and information science, which includes basic theoretical skills, practical knowledge and skills essential for the field of computer and information science, Basic skills in computer and information science, allowing the continuation of studies in the second study cycle.

Predvideni študijski rezultati:

Znanje in razumevanje:

Poznavanje arhitekture računalniških sistemov in osnovnih orodij za razvoj strojev za računanje. Ta vključujejo kvantitativne metode za primerjavo in ocenjevanje različnih računalniških arhitektur.

Uporaba:

Razumeti, kako računalnik deluje in kakšne so njegove omejitve, predstavlja osnovo za razvoj kvalitetne programske opreme. Pomembno pa je tudi pri nakupu računalniške opreme.

Refleksija:

Odpraviti pogosto stanje, kjer se na računalnik gleda kot na črno škatlo, ki izvaja programe na čudežen način.

Prenosljive spretnosti:

Predmet se dopolnjuje s predmeti s področja programiranja, algoritmov in digitalnih vezij.

Intended learning outcomes:

Knowledge and understanding:

The ability to autonomously develop programs, the familiarity with basic data structures and algorithms, the ability to independently design data structures and algorithms.

Application:

The use of the learned principles for programming and design of data structures and algorithms for the development of large systems.

Reflection:

Understanding of basic principles of designing programs and algorithms and understanding of their role for the development of large systems.

Transferable skills:

The ability to design the solution of different problems using programs and algorithms, the ability to use the learned concepts for programming in an arbitrary programming language.

Metode poučevanja in učenja:

Predavanja, domače naloge, seminarski način dela pri vajah. Poseben poudarek je na sprotne študiju in na samostojnem delu pri domačih nalogah, vajah in seminarjih.

Learning and teaching methods:

Lectures, home works, seminar works during tutorials. The emphasis is on continuous study and on autonomous and independent work at home works, exercises and seminars.

Načini ocenjevanja:

Delež (v %) /

Weight (in %)

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

Sprotne preverjanje (domače naloge, kolokviji in projektne delo)

Ocena vaj

Končno preverjanje (pisni in ustni izpit)

Ocene: 6-10 pozitivno, 1-5 negativno

50%

50%

Midterm work consists of laboratory exercises, homeworks and midterm exams.

Final exam (written and theoretical exam)

Grading: 6-10 pass, 1-5 fail.

Reference nosilca / Lecturer's references:

KONONENKO, Igor, KUKAR, Matjaž. Machine learning and data mining : introduction to principles and algorithms. Chichester: Horwood Publishing, cop. 2007. XIX, 454 str., ilustr. ISBN 1-904275-21-4. ISBN 978-1-904275-21-3. [COBISS.SI-ID 5961556]

ŠTRUMBELJ, Erik, KONONENKO, Igor. An efficient explanation of individual classifications using game theory. Journal of machine learning research, ISSN 1532-4435. [Print ed.], Jan. 2010, vol. 11, no. [1], str. 1-18, ilustr. [COBISS.SI-ID 7543636]

ROBNIK ŠIKONJA, Marko, KONONENKO, Igor. Theoretical and empirical analysis of ReliefF and RReliefF. Machine learning, ISSN 0885-6125. [Print ed.], 2003, vol. 53, str. 23-69, graf. prikazi. [COBISS.SI-ID 3813460]

KONONENKO, Igor, BRATKO, Ivan. Information-based evaluation criterion for classifier's performance. Machine learning, ISSN 0885-6125. [Print ed.], 1991, vol. 6, no. 1, str. 67-80. [COBISS.SI-ID 7717972]

KONONENKO, Igor. Machine learning for medical diagnosis : history, state of the art and perspective. Artificial intelligence in medicine, ISSN 0933-3657. [Print ed.], 2001, vol. 23, no. 1, str.

89-109. [COBISS.SI-ID 2545236]