Univerza v Mariboru

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Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Podatkovne strukture**
Course title:	Data structures

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Matematika	Uporabna matematika	**2.**	**3.**
Mathematics	Applied Mathematics	**2.**	**3.**

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
45			**30**		**135**	**7**

Nosilec predmeta / Lecturer: Aleksander VESEL

Jeziki / Languages:	
Predavanja / Lectures:	SLOVENSKO/SLOVENE
Vaje / Tutorial:	SLOVENSKO/SLOVENE

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Jih ni.	There are none.

Vsebina:	**Content (Syllabus outline):**
Analiza algoritma: časovna in prostorska zahtevnost. Osnovne podatkovne strukture: sklad, vrsta in povezani seznam. Predstavitve in uporaba. Drevesa: dvojiško drevo, predstavitev in pregled. Kopica in vrsta s prednostjo. Iskalna drevesa: dvojiška iskalna drevesa, AVL drevesa, rdeče črna drevesa, B drevesa.	Algorithm analysis: time and space complexity. Elementary data structures: stack, queue and linked list. Implementations and applications. Trees: binary tree, implementation and traversal. Heap and priority queue. Search trees: binary search tree, AVL tree, red-black tree, B tree.

Graf: predstavitve in pregled grafa. Tabele simbolov: primeri, zgoščene tabele.	Graph: graph representations and traversal. Dictionaries: examples, hash tables.

Temeljni literatura in viri / Readings:

J. Kozak, Podatkovne strukture in algoritmi, Ljubljana, DMFA,1997.

T.H. Cormen, C.E. Leiserson, R.L. Rivest, Introduction to algorithms, The MIT Press, 2001.

D.L. Baldwin, G.W. Scragg, Algorithms and data structures : the science of computing, Charles River Media, 2004.

Cilji in kompetence:	**Objectives and competences:**
Spoznati temeljne koncepte podatkovnih struktur, osnove teorije zahtevnosti algoritmov in značilne podatkovne strukture: osnovne (sklad, vrsta, povezani seznam,..) ter zahtevnejše (drevesa, kopice, iskalna drevesa, imenike).	Know fundamental concepts of data structures, basic concepts of algorithms analysis as well as a variety of data structures: elementary (stack, queue, linked list, ...) and advanced (trees, heaps, search trees, dictionarys, ...).

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Razumevanje zahtevnejših podatkovnih struktur. • Seznaniti se osnovami analize algoritmov. • Razumeti pomen in uporabo osnovnih in zahtevnejših podatkovnih struktur. • Prepoznati vpliv izbire podatkovne strukture na zahtevnost algoritma pri različnih praktičnih aplikacijah. Prenesljive/ključne spretnosti in drugi atributi: • Prenos znanja uporabe podatkovnih struktur na sorodna oziroma povezana področja (računalništvo, diskretna matematika, biologija, ekonomija...)	Knowledge and Understanding: • Be able to understand more demanding data structures. • To know the principles of algorithm analysis. • To understand the meaning and application of elementary and advanced data stuctures. • To recognize the influence of data structure to algorithm complexity in practical applications. Transferable/Key Skills and other attributes: • Knowledge transfer of data structures theory and applications into other fields (discrete mathematics, computer science, biology, economics, …)

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Računalniške vaje	• Lectures • Computer exercises

Načini ocenjevanja:		**Assessment:**
Način (pisni izpit, ustno izpraševanje,	Delež (v %) /	Type (examination, oral, coursework,

naloge, projekt) Pisni test – problemi Izpit (pisni) - teorija Naloge Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Pozitivni oceni pri pisnem testu in nalogah sta pogoj za pristop k izpitu.	Weight (in %) 40% 40% 20%	project): Written test - problems Exam (written) – theory Coursework Each of the mentioned commitments must be assessed with a passing grade. Passing grades of the written test and coursework are required for taking the exam.
Reference nosilca / Lecturer's references:		

1. KORŽE, Danilo, VESEL, Aleksander. A note on the independence number of strong products of odd cycles. *Ars comb.*, 2012, vol. 106, str. 473-481. [COBISS.SI-ID 16138006]

2. TARANENKO, Andrej, VESEL, Aleksander. 1-factors and characterization of reducible faces of plane elementary bipartite graphs. *Discuss. Math., Graph Theory*, 2012, vol. 32, no. 2, str. 289-297, doi: 10.7151/dmgt.1607. [COBISS.SI-ID 19104264]

3. SALEM, Khaled, KLAVŽAR, Sandi, VESEL, Aleksander, ŽIGERT, Petra. The Clar formulas of a benzenoid system and the resonance graph. *Discrete appl. math.*. [Print ed.], 2009, vol. 157, iss. 11, str. 2565-2569. http://dx.doi.org/10.1016/j.dam.2009.02.016. [COBISS.SI-ID 15142489]

4. VESEL, Aleksander. 4-tilings of benzenoid graphs. *MATCH Commun. Math. Comput. Chem. (Krag.)*, 2009, vol. 62, no. 1, str. 221-234. [COBISS.SI-ID 16886536]

5. TARANENKO, Andrej, VESEL, Aleksander. Characterization of reducible hexagons and fast decomposition of elementary benzenoid graphs. *Discrete appl. math.*. [Print ed.], 2008, vol. 156, iss. 10, str. 1711-1724. http://dx.doi.org/10.1016/j.dam.2007.08.029, doi: 10.1016/j.dam.2007.08.029. [COBISS.SI-ID 16140552]