Univerza v Mariboru

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, 1. stopnja		**2.**	**3.**
Mathematics, 1st cycle		**2.**	**3.**

Vrsta predmeta / Course type Obvezni / Compulsory

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:**
Osnove računalništva in informatike	Fundamentals of Computer Science and Informatics

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, 2009.

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:**
	Delež (v %) / Weight (in %)	
<u>Sprotno preverjanje:</u>		<u>Mid-term testing:</u>
Pisni testi – teorija (3 do 5 pisnih testov na semester)	40%	Written tests – theory (from 3 to 5 written tests during the semester)
Naloge	20%	Coursework
<u>Izpit:</u>		<u>Exams:</u>
Pisni izpit – problemi	40%	Written exam - problems
Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.		Each of the mentioned commitments must be assessed with a passing grade.
Opravljene sprotne obveznosti so pogoj za pristop k izpitu.		Passing grades of all mid-term testings are required for taking the exam.

Reference nosilca / Lecturer's references:

1. KORŽE, Danilo, MARKUŠ, Žiga, VESEL, Aleksander. A heuristic approach for searching (d,n)-packing colorings of infinite lattices. *Discrete applied mathematics*, ISSN 0166-218X. [Print ed.], March 2019, vol. 257, str. 353-358. https://doi.org/10.1016/j.dam.2018.09.018,[COBISS.SI-ID 21821462].

2. KORŽE, Danilo, VESEL, Aleksander. Packing coloring of generalized Sierpiński graphs. *Discrete mathematics and theoretical computer science*, ISSN 1365-8050, 2019, vol. 21, no. 3, str. 1-18. https://dmtcs.episciences.org/5178/pdf. [COBISS.SI-ID 22126870].

3. VESEL, Aleksander. Cube-complements of generalized Fibonacci cubes. *Discrete Mathematics*, ISSN 0012-365X. [Print ed.], April 2019, vol. 342, iss. 4, str. 1139-1146. https://doi.org/10.1016/j.disc.2019.01.008, [COBISS.SI-ID 18539097].

4. SHAO, Zehui, VESEL, Aleksander, XU, Jin. The k-distance independence number and 2-distance chromatic number of Cartesian products of cycles. *Bulletin of the Malaysian Mathematical Society*, ISSN 0126-6705, 2018, vol. 41, iss. 3, str. 1377-1391, doi: 10.1007/s40840-016-0397-0. [COBISS.SI-ID 22601992].

5. KORŽE, Danilo, VESEL, Aleksander. (d,n)-packing colorings of infinite lattices. *Discrete applied mathematics*, ISSN 0166-218X. [Print ed.], March 2018, vol. 237, str. 97-108, doi: 10.1016/j.dam.2017.11.036. [COBISS.SI-ID 21067542].