



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, 1 st degree		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:

Osnove računalništva in informatike

Prerequisites:

Fundamentals of Computer Science and Informatics

Vsebina:

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.

Content (Syllabus outline):

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.

Graph: graph representations and traversal.

Graf: predstavitve in pregled grafa.

Tabele simbolov: primeri, zgoščene tabele.

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:

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).

Objectives and competences:

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:

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.

Prenosljive/ključne spretnosti in drugi atributi:

- Prenos znanja uporabe podatkovnih struktur na sorodna oziroma povezana področja (računalništvo, diskretna matematika, biologija, ekonomija...)

Intended learning outcomes:

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 structures.
- 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:

- Predavanja
- Računalniške vaje

Learning and teaching methods:

- Lectures
- Computer exercises

Načini ocenjevanja:**Assessment:**

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

1. VESEL, Aleksander. Fibonacci dimension of the resonance graphs of catacondensed benzenoid graphs. *Discrete appl. math.*. [Print ed.], 2013, str. 1-11, doi: [10.1016/j.dam.2013.03.019](https://doi.org/10.1016/j.dam.2013.03.019).
2. SHAO, Zehui, VESEL, Aleksander. A note on the chromatic number of the square of the Cartesian product of two cycles. *Discrete math.*. [Print ed.], 2013, vol. 313, iss. 9, str. 999-1001.
3. 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](https://www.cobiss.si/id/16138006)]
4. 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](https://doi.org/10.7151/dmgt.1607). [COBISS.SI-ID [19104264](https://www.cobiss.si/id/19104264)]
5. 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](https://www.cobiss.si/id/15142489)]