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, 2022.

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

Cilji in kompetence:	**Objectives and competences:**
Cilj in kompetence tega predmeta so, da študentje spoznajo temeljne koncepte podatkovnih struktur, osnove teorije zahtevnosti algoritmov in značilne podatkovne strukture: osnovne (sklad, vrsta, povezani seznam,..) ter zahtevnejše (drevesa, kopice, iskalna drevesa, imenike).	The objectives and competences of this course are for students to 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 %)	
Sprotno preverjanje:		Mid-term testing:
Pisni testi – teorija (vsaj trije pisni testi na semester)	40%	Written tests – theory (at least three written tests during the semester)
Naloge	20%	Coursework
Izpit:		Exams:
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. VESEL, Aleksander. Binary coding of resonance graphs of catacondensed polyhexes. *Match : communications in mathematical and in computer chemistry*. 2023, vol. 90, no. 2, str. 429-452. ISSN 0340-6253. DOI: 10.46793/match.90-2.429V. [COBISS.SI-ID 148521219]

2. KORŽE, Danilo, VESEL, Aleksander. General Position Sets in Two Families of Cartesian Product Graphs. *Mediterranean journal of mathematics*. Published 06 May 2023, 12 str. ISSN 1660-5446. DOI: 10.1007/s00009-023-02416-z. [COBISS.SI-ID 151233539]

3. KORŽE, Danilo, SHAO, Zehui, VESEL, Aleksander. New results on radio k-labelings of distance graphs. *Discrete applied mathematics*. [Print ed.]. 15 Oct. 2022, vol. 319, str. 472-479. ISSN 0166-218X. DOI: 10.1016/j.dam.2021.09.007. [COBISS.SI-ID 78298371].

4. DENG, Fei, SHAO, Zehui, VESEL, Aleksander. On the packing coloring of base-3 Sierpiński graphs and H-graphs. *Aequationes mathematicae*. 2021, vol. 95, iss. 2, str. 329-341. ISSN 0001-9054. DOI: 10.1007/s00010-020-00747-w. [COBISS.SI-ID 27121667].

5. VESEL, Aleksander. Efficient proper embedding of a daisy cube. *Ars mathematica contemporanea*. [Tiskana izd.]. 2021, vol. 21, no. 2, str. 271-282. ISSN 1855-3966. https://amc-journal.eu/index.php/amc/article/download/2454/1711, http://www.dlib.si/details/URN:NBN:SI:doc-LNSLRXNG, DOI: 10.26493/1855-3974.2454.892. [COBISS.SI-ID 72352259].