



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Algoritmi in podatkovne strukture
<b>Course title:</b>	Algorithms and data structures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	5	9
Five-year master's degree program Subject Teacher	/		

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
25	5		45		105	6

Nosilec predmeta / Lecturer:

Jeziki / Languages: 

Predavanja / Lectures:	Slovenski/Slovenian
Vaje / Tutorial:	Slovenski/Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:  Prerequisites:

Vsebina:  Content (Syllabus outline):

Analiza algoritma: časovna in prostorska zahtevnost.

Osnovne podatkovne strukture in njihov pomen: sklad, vrsta in povezani seznam.

Drevesa: dvojiško drevo, predstavitev in pregled. Kopica in vrsta s prednostjo.

Dvojiška iskalna drevesa,

Algoritmično reševanje problemov: primeri problemov in načini reševanja.

Algorithm analysis: time in space complexity.

Elementary data structures: stack, queue and linked list.

Trees: binary tree, implementation and traversal. Heap and priority queue.

Binary search trees.

Algorithmic problem solving: examples of problems and methods of solving.

### Temeljni literatura in viri / Readings:

K. Mehlkor, P. Sanders, Algorithms and data structures : the basic toolbox, Springer, 2008.

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

D. Harel, Y. Feldman, Algorithmics : the spirit of computing, AddisonWesley : Pearson Education, 2004.

M.A. Weiss, Data structures and algorithms analysis, The Benjamin/Cummings Publishing Company, 1995.

J.H. Jeffrey, Algorithms and data structures : design, correctness, analysis, AddisonWesley 1997.

### Cilji in kompetence:

- Spoznati osnove algoritmičnega reševanja problemov.
- Spoznati temeljne koncepte podatkovnih struktur in njihovo uporabo.
- Spoznati osnovne strategije snovanja algoritmov.

### Objectives and competences:

- Know basic concepts from algorithmic problem solving.
- Know fundamental concepts of data structures and their applications.
- Know basic algorithm design techniques.

### Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumeti pomen ter uporabo osnovnih in zahtevnejših podatkovnih struktur.
- Prepoznati vpliv izbire podatkovne strukture na zahtevnost algoritma pri različnih praktičnih aplikacijah.
- Razumevanje principov analize algoritmov.

### Intended learning outcomes:

Knowledge and understanding:

- 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.
- To understand principles of algorithm analysis.

<ul style="list-style-type: none"> <li>• Razumeti pomen strategij snovanja algoritmov.</li> </ul> <p>Prenosljive/ključne spretnosti in drugi atributi:</p> <ul style="list-style-type: none"> <li>• Prenos znanja algoritmičnega razmišljanja na sorodna oziroma povezana področja ( diskretna matematika, biologija, kemija...)</li> </ul>	<ul style="list-style-type: none"> <li>• To understand the meaning of algorithm design.</li> </ul> <p>Transferable/Key Skills and other attributes:</p> <ul style="list-style-type: none"> <li>• Knowledge transfer of algorithmic thinking into other fields (discrete mathematics, biology, chemistry, ...)</li> </ul>
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#### Metode poučevanja in učenja:

<ul style="list-style-type: none"> <li>• Predavanja</li> <li>• Seminar</li> <li>• Računalniške in teoretične vaje</li> </ul>
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#### Learning and teaching methods:

<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Seminary work</li> <li>• Computer and theoretical exercises</li> </ul>
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#### Načini ocenjevanja:

Delež (v %) /  
Weight (in %)

#### Assessment:

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
<u>Sprotno preverjanje:</u>		<u>Mid-term testing:</u>
Domače naloge	20%	Homework
Seminar	10%	Seminary work
<u>Izpit:</u>		<u>Exams:</u>
Pisni izpit – problemi	30%	Written exam – problems
Pisni izpit – teorija	40%	Written exam – theory
Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.		Each of the mentioned assessments must be assessed with a passing grade.
Opravljene sprotne obveznosti so pogoj za pristop k pisnemu izpitu – problemi. Opravljene pisni izpit – problemi je pogoj za pristop k pisnemu izpitu – teorija.		Passing grades of all mid-term testings are required for taking the written exam – problems. Passing grade of written exam – problems is required to take the written exam – theory.

#### Reference nosilca / Lecturer's references:

1. 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](https://doi.org/10.1007/s00010-020-00747-w). [COBISS.SI-ID [27121667](#)]
2. VESEL, Aleksander. Efficient proper embedding of a daisy cube. *Ars mathematica contemporanea*. [Tiskana izd.]. 2021, str. 1-12. ISSN 1855-3966. DOI: [10.26493/1855-3974.2454.892](https://doi.org/10.26493/1855-3974.2454.892). [COBISS.SI-ID [72352259](#)]

3. SHAO, Zehui, ZHU, Enqiang, XU, Jin, VESEL, Aleksander, ZHANG, Xiujun. Optimizing distance constraints frequency assignment with relaxation. *RAIRO-Operations Research*. 2021, vol. 55, suppl., str. s1355-s1367. ISSN 0399-0559. DOI: [10.1051/ro/2020043](https://doi.org/10.1051/ro/2020043). [COBISS.SI-ID [27152387](#)]
4. KORŽE, Danilo, VESEL, Aleksander. Packing coloring of generalized Sierpiński graphs. *Discrete mathematics & theoretical computer science*, ISSN 1365-8050, 2019, vol. 21, no. 3, str. 1-18. <https://dmtcs.episciences.org/5178/pdf>. [COBISS.SI-ID [22126870](#)]
5. KORŽE, Danilo, MARKUŠ, Žiga, VESEL, Aleksander. A heuristic approach for searching (d,n)-packing colorings of infinite lattices. *Discrete applied mathematics*. [Print ed.]. March 2019, vol. 257, str. 353-358. ISSN 0166-218X. <https://doi.org/10.1016/j.dam.2018.09.018>, DOI: [10.1016/j.dam.2018.09.018](https://doi.org/10.1016/j.dam.2018.09.018). [COBISS.SI-ID [21821462](#)]