



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Osnove računalništva in informatike
Course title:	Fundamentals of Computer Science and Informatics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 1. stopnja		1.	1.
Mathematics, 1 st cycle		1.	1.

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			45		120	7

Nosilec predmeta / Lecturer:

Jeziki / Languages:	Predavanja / Lectures:	<input type="text" value="SLOVENSKO/SLOVENE"/>
	Vaje / Tutorial:	<input type="text" value="SLOVENSKO/SLOVENE"/>

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

Prerequisites:

Vsebina:

Zgradba osebnega računalnika: centralna procesna enota, pomnilniške enote, vhodno izhodne enote.

Matematične osnove predstavitve informacije v računalniku: dvojiški zapis, količina informacije, predstavitev števil, znakov in grafike.

Content (Syllabus outline):

Computer hardware: central processing unit, RAM and secondary storage, input and output devices.

Mathematical basis for representation of information: binary sistem, representation of numbers, characters and graphics.

Programming languages: machine languages, assembly languages, high-level languages, fourth generation languages.

Programski jeziki: strojni, zbirni, višji programski jeziki, programski jeziki 4. generacije, primeri.

Struktura programa, spremenljivke in konstante, branje in izpis, aritmetični in logični izrazi ter prireditveni stavek.

Krmilni stavki: zaporedje, vejitve in zanke.

Podatkovni tipi: osnovni, sestavljeni, proceduralni.

Podprogrami in rekurzivni podprogrami.

Osnovni matematični algoritmi: Evklidov, Hornerjev, linearne, kvadratne in rekurzivne funkcije.

Program structure, variables and constants, read and write procedures, arithmetic and logic expressions, assignment statement.

Structured statements: compound, conditional and loop statements.

Data types: simple, structural, procedural.

Procedures and recursive procedures.

Fundamental mathematical algorithms: Euclid's, Horner's, linear, quadratic and recursive functions.

Temeljni literatura in viri / Readings:

Deloma odvisni od izbranega programskega jezika:

D. Capper, *Introducing C++ for Scientists, Engineers and Mathematicians*, Springer, 2001.

G. Bervar, *C++ na kolenih*, Študentska založba, 2008.

J. G. Brookshear, *Computer science: an overview*, Addison-Wesley, 2014.

D. Hankerson, *Introduction to Information Theory and Data Compression*, Chapman & Hall/CRC, 2003.

Cilji in kompetence:

Spoznati temeljne matematične koncepte računalništva in informatike (zgradba računalnika, predstavitev informacije v računalniku, vrste programskih jezikov) ter osnove višjega programskega jezika.

Objectives and competences:

Know fundamental mathematical concepts from computer science (computer hardware, representation of information, programming languages) and the fundamental principles of a high-level programming language.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Poznavanje zgradbe računalnika.
- Spoznati različne generacije programskih jezikov.
- Spoznati osnove izbranega programskega jezika.

Intended learning outcomes:

Knowledge and Understanding:

- To know the computer hardware.
- To know a variety of programming languages.
- To know the fundamental principles of a high-level programming language.

<ul style="list-style-type: none"> • Sposobnost pisanja srednje zahtevnih programov. <p>Prenesljive/ključne spretnosti in drugi atributi:</p> <ul style="list-style-type: none"> • Prenos znanja matematičnih konceptov računalništva na druga področja (matematika, biologija, kemija) 	<ul style="list-style-type: none"> • Be able to write a moderately complex computer program. <p>Transferable/Key Skills and other attributes:</p> <ul style="list-style-type: none"> • Knowledge transfer of mathematical concepts of computer science into other fields (mathematics, chemistry, biology)
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<p>Metode poučevanja in učenja:</p> <ul style="list-style-type: none"> • Predavanja • Računalniške vaje 	<p>Learning and teaching methods:</p> <ul style="list-style-type: none"> • Lectures • Computer exercises
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<p>Načini ocenjevanja:</p>	<p>Assessment:</p>
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	Delež (v %) / Weight (in %)	
<p><u>Sprotno preverjanje:</u> Pisni testi – teorija (3 do 5 pisnih testov na semester) Naloge</p>	40%	<p><u>Mid-term testing:</u> Written tests – theory (from 3 to 5 written tests during the semester) Coursework</p>
<p><u>Izpit:</u> Pisni izpit – problemi</p>	40%	<p><u>Exams:</u> Written exam - problems</p>
<p>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.</p>		<p>Each of the mentioned commitments must be assessed with a passing grade.</p>
<p>Opravljene sprotne obveznosti so pogoj za pristop k izpitu.</p>		<p>Passing grades of all mid-term testings are required for taking the exam.</p>

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](https://doi.org/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](https://doi.org/10.1016/j.dam.2017.11.036). [COBISS.SI-ID [21067542](#)].