



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:

Cilji in kompetence tega predmeta so, da študentje spoznajo temeljne matematične koncepte računalništva in informatike (zgradba računalnika, predstavitev informacije v računalniku, vrste programskih jezikov) ter osnove višjega programskega jezika.

Objectives and competences:

The objectives and competences of this course are for students to 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></p> <p>Pisni testi – teorija (vsaj trije pisni testi na semester)</p> <p>Naloge</p>	<p>40%</p> <p>20%</p>	<p><u>Mid-term testing:</u></p> <p>Written tests – theory (at least three written tests during the semester)</p> <p>Coursework</p>
<p><u>Izpit:</u></p> <p>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><u>Exams:</u></p> <p>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>

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](https://doi.org/10.46793/match.90-2.429V). [COBISS.SI-ID [148521219](https://www.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](https://doi.org/10.1007/s00009-023-02416-z). [COBISS.SI-ID [151233539](https://www.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](https://doi.org/10.1016/j.dam.2021.09.007). [COBISS.SI-ID [78298371](https://www.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](https://doi.org/10.1007/s00010-020-00747-w). [COBISS.SI-ID [27121667](https://www.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](https://doi.org/10.26493/1855-3974.2454.892). [COBISS.SI-ID [72352259](https://www.dlib.si/details/URN:NBN:SI:doc-LNSLRXNG)].