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
Enovit magistrski študijski program druge stopnje Predmetni učitelj	**/**	1.	1.
Five-year master's degree program Subject Teacher	**/**		

Vrsta predmeta / Course type	Obvezni/ Obligatory
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			60		75	6

Nosilec predmeta / Lecturer:	Aleksander Vesel

Jeziki / Languages:	**Predavanja / Lectures:**	Slovenski/Slovenian
	Vaje / Tutorial:	Slovenski/Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
/	/

Vsebina:	**Content (Syllabus outline):**
Zgradba računalnika. Predstavitev informacije v računalniku: dvojiški zapis, količina informacije, predstavitev števil, znakov in grafike. 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.	Computer hardware. Representation of information: binary sistem, representation of numbers, characters and graphics. Programming languages: machine languages, assembly languages, high-level languages, fourth generation languages. Program structure, variables and constants, read and write procedures, arithmetic and logic expressions, assignment statement.

Krmilni stavki: zaporedje, vejitve in zanke. Podatkovni tipi: osnovni, sestavljeni, proceduralni. Podprogrami in rekurzivni podprogrami. Enostavni izobraževalni računalniški programi. Osnovni algoritmi. Zahtevnost algoritmov.	Structured statements: compound, conditional and loop statements. Data types: simple, structural, procedural. Procedures and recursive procedures. Basic educational computer programs. Fundamental algorithms. Algorithm complexity.

Temeljni literatura in viri / Readings:

D. Capper, Introducing C++ for Scientists, Engineers and Mathematicians, Springer, 2001.
J. G. Brookshear, Computer science: an overview, Addison-Wesley, 2005.
R. A. Szymanski et al., Introduction to computers and software, Prentice-Hall, 1996.
D. Hankerson, Introduction to Information Theory and Data Compression, Chapman & Hall/CRC, 2003.
E.R. Scheinerman, C++ for mathematicians : an introduction for students and professionals, Chapman & Hall/CRC, 2006.

Cilji in kompetence:	**Objectives and competences:**
Spoznati temeljne koncepte računalništva in informatike (zgradba računalnika, predstavitev informacije v računalniku, vrste programskih jezikov) ter osnove višjega programskega jezika.	Know fundamental concepts of computer science (computer hardware, representation of information, programming languages) and the fundamental principles of a high-level programming language.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Poznavanje predstavitve informacije v računalniku. • Spoznati različne generacije programskih jezikov • Spoznati osnove izbranega programskega jezika. • Sposobnost pisanja srednje zahtevnih • programov. **Prenesljive/ključne spretnosti in drugi atributi:** Prenos znanja računalništva na druga področja (matematika, biologija, kemija, optimizacija, ...)	Knowledge and understanding: • To kow the representation of information. • To know a variety of programming languages generations. • To know the fundamental principles of a high-level programming language. • Be able to write a moderately complex computer program. **Transferable/Key Skills and other attributes:** Knowledge transfer of methods of computer science into other fields (mathematics, chemistry, biology, optimization, …)

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Računalniške vaje	• Lectures • Computer exercises

Delež (v %) /

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

Reference nosilca / Lecturer's references:

1. VESEL, Aleksander. Fast computation of clar formula for benzenoid graphs without nice coronenes. *MATCH Communications in Mathematical and in Computer Chemistry*, ISSN 0340-6253, 2014, vol. 71, no. 3, str. 717-740.

2. SHAO, Zehui, VESEL, Aleksander. A note on the chromatic number of the square of the Cartesian product of two cycles. *Discrete Mathematics*, ISSN 0012-365X. 2013, vol. 313, iss. 9, str. 999-1001.

3. VESEL, Aleksander. Linear recognition and embedding of Fibonacci cubes. *Algorithmica*, ISSN 0178-4617, 2013, str. 1-14, doi: 10.1007/s00453-013-9839-3.

4. KORŽE, Danilo, VESEL, Aleksander. On the packing chromatic number of square and hexagonal lattice. *Ars mathematica contemporanea*, ISSN 1855-3966. 2014, vol. 7, no. 1, str. 13-22.

5. VESEL, Aleksander. Fibonacci dimension of the resonance graphs of catacondensed benzenoid graphs. *Discrete applied mathematics*, ISSN 0166-218X. 2013, vol. 161, issue 13-14, str. 2158-2168.