



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Algoritmi v diskretni matematiki
Course title:	Algorithms in discrete mathematics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna matematika – enopredmetna, 2. stopnja		2	3
Educational mathematics single-major, 2nd cycle		2	3

Vrsta predmeta / Course type

izbirni/elective

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	15		30		90	6

Nosilec predmeta / Lecturer:

Andrej Taranenko

**Jeziki /
Languages:**

**Predavanja /
Lectures:**

SLOVENSKO/SLOVENE

Vaje / Tutorial:

SLOVENSKO/SLOVENE

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

Pozitivne ocene pri kolokvijih, ustni predstavitvi in projektu so pogoj za pristop k pisnemu izpitu.

Vsebina:

Vsebina predmeta se prilagaja aktualnim potrebam in razvoju. Poglobili bomo znanje iz uporabe računalnika pri reševanju matematičnih problemov, predvsem s področja diskretne matematike.

Prerequisites:

Passing grades for the midterm exams, oral presentation and the project are required for taking the written exam.

Content (Syllabus outline):

The contents of this subject is adjusted to the current needs and development. We will deepen the knowledge of using a computer to solve mathematical problems, mainly from discrete mathematics.

Primeri poglavij:

- urejenosti kombinatoričnih objektov
- algoritmi generiranja kombinatoričnih objektov
- učinkovita predstavitev grafov
- prepoznavanje nekaterih družin grafov

Sample chapters:

- orderings of combinatorial objects
- algorithms for generating combinatorial objects
- efficient presentation of graphs
- recognition of some families of graphs

Temeljni literatura in viri / Readings:

D. L. Kreher in D. R. Stinson, *Combinatorial algorithms: generation, enumeration, and search*. Boca Raton [etc.]: CRC, 1999, str. 329.

K. H. Rosen, *Discrete mathematics and its applications*, 6th ed., International ed. Boston [etc.]: McGraw-Hill, 2007, str. XXII, 843, A-15.

T. H. Cormen, C. E. Leiserson, in R. L. Rivest, *Introduction to algorithms*, 21st printing. Cambridge (Massachusetts); London (England); New York [etc.]: The MIT Press; McGraw-Hill, 1990/1998, cop., str. XVII, 1028.

R. H. Hammack, W. Imrich, in S. Klavžar, *Handbook of product graphs*. Boca Raton; London; New York: CRC Press, 2011, str. XVIII, 518.

Cilji in kompetence:

Z uporabo modernega, predmetno usmerjenega programskega jezika, poglobiti znanje iz pristopov, podatkovnih struktur in algoritmov pri reševanju matematičnih problemov.

Objectives and competences:

With the usage of modern object oriented programming language, to deepen the knowledge of the basic approaches, data structures and algorithms for solving mathematical problems.

Predvideni študijski rezultati:

Po zaključku tega predmeta bo študent sposoben izkazati poglobljeno razumevanje podatkovnih struktur matematičnih modelov ter algoritmično reševati probleme v diskretni matematiki.

Prenesljive/ključne spretnosti in drugi atributi:

- uporaba matematičnih pojmov v programskih aplikacijah
- uporaba ustreznih podatkovnih struktur pri implementaciji matematičnih algoritmov
- pridobljena znanja se prenašajo na druge z računalništvom povezane predmete

Intended learning outcomes:

Knowledge and Understanding:
On completion of this course the student will be able to demonstrate deepened understanding of mathematical models' data structures as well as algorithmically solve problems in discrete mathematics.

Transferable/Key Skills and other attributes:

- the usage of mathematical notions in applications
- the usage of appropriate data structures while implementing mathematical algorithms

	the obtained knowledge is transferable to the other computer science oriented subjects
Metode poučevanja in učenja:	Learning and teaching methods:
- Predavanja, seminar - Računalniške vaje	- Lectures, seminary - Computer exercises

Načini ocenjevanja:	Assessment:
<u>kolokviji</u> <u>ustna predstavitev</u> <u>projekt</u> <u>pisni izpit</u>	Delež (v %) / Weight (in %) 40 % 20 % 20 % 20 % <u>midterm exam</u> <u>oral presentation</u> <u>project</u> <u>written exam</u>
Reference nosilca / Lecturer's references:	

1. BANIČ, Iztok, TARANENKO, Andrej. *Span of a graph : keeping the safety distance*. Discrete mathematics & theoretical computer science. 2023, vol. 25, no. 1, 19 str. ISSN 1365-8050, DOI: 10.46298/dmtcs.9859, DOI: 20.500.12556/DKUM-88137. [COBISS.SI-ID 148408835]
2. DRAVEC, Tanja, TARANENKO, Andrej. *Daisy Hamming graphs*. Discussiones mathematicae. Graph theory. 2023, vol. 43, no. 2, str. 421-436. ISSN 1234-3099, DOI: 10.7151/dmgt.2373, DOI: 20.500.12556/DKUM-88118. [COBISS.SI-ID 137313795]
3. TARANENKO, Andrej. *Daisy cubes: a characterization and a generalization*. European journal of combinatorics. March 2020, vol. 85, art. 103058 [10 str.]. ISSN 0195-6698. <https://doi.org/10.1016/j.ejc.2019.103058>, DOI: 10.1016/j.ejc.2019.103058. [COBISS.SI-ID 18934105]
4. ZHU, Enqiang, TARANENKO, Andrej, SHAO, Zehui, XU, Jin. *On graphs with the maximum edge metric dimension*. Discrete applied mathematics. [Print ed.]. March 2019, vol. 257, str. 317-324. ISSN 0166-218X. <https://doi.org/10.1016/j.dam.2018.08.031>, DOI: 10.1016/j.dam.2018.08.031. [COBISS.SI-ID 18584665]
5. PETERIN, Iztok, SCHREYER, Jens, FECKOVÁ ŠKRABUL'ÁKOVÁ, Erika, TARANENKO, Andrej. *A note on the Thue chromatic number of lexicographic products of graphs*. Discussiones mathematicae. Graph theory. 2018, vol. 38, iss. 3, str. 635-643. ISSN 1234-3099. <http://www.discuss.wmie.uz.zgora.pl/php/discuss3.php?ip=&url=pdf&nIdA=25507&nIdSesji=-1>, DOI: 10.7151/dmgt.2032. [COBISS.SI-ID 18373465]