



Univerza v Mariboru



Univerza v Mariboru

Fakulteta za naravoslovje in  
matematiko

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

|                      |                                      |
|----------------------|--------------------------------------|
| <b>Predmet:</b>      | Programiranje v diskretni matematiki |
| <b>Course title:</b> | Programming in discrete mathematics  |

| Študijski program in stopnja<br>Study programme and level | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|-----------------------------------------------------------|-------------------------------|-------------------------|----------------------|
| Matematika, 2. stopnja                                    | Modul F1                      | 1. ali 2.               | 1. ali 3.            |
| Mathematics, 2 <sup>nd</sup> degree                       | Module F1                     | 1. or 2.                | 1. or 3.             |

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

| Predavanja<br>Lectures | Seminar<br>Seminar | Sem. vaje<br>Tutorial | Lab. vaje<br>Laboratory work | Teren. vaje<br>Field work | Samost. delo<br>Individ. work | ECTS |
|------------------------|--------------------|-----------------------|------------------------------|---------------------------|-------------------------------|------|
| 45                     | 15                 |                       | 45                           |                           | 165                           | 9    |

Nosilec predmeta / Lecturer:

Andrej Taranenko

Jeziki /

Languages:

Predavanja /

Lectures:

Vaje / Tutorial:

SLOVENSKO/SLOVENE

SLOVENSKO/SLOVENE

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

Prerequisites:



Vsebina:

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

- Relacije in algoritmi nad relacijami
- Boolova algebra
- Prirejanja v grafih

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.

- relations and algorithms on relations
- Bool algebra
- matchings in graphs

### Temeljni literatura in viri / Readings:

B. Vilfan, Osnovni algoritmi, ISBN 961-6209-13-2, Založba FER in FRI, 2. izd., 2002.

Kenneth H. Rosen, Discrete Mathematics and Its Applications, ISBN 007-2880-08-2, McGraw-Hill, 6th ed., 2007.

Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, ISBN 026-2032-93-7, The MIT Press, 2nd ed., 2001.

### 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:

Znanje in razumevanje:

- podatkovne strukture matematičnih modelov
- razumevanje, implementacija in uporaba pomembnejših algoritmov

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:

- data structures of mathematical models
- understanding, implementation and usage of important algorithms

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:

- Predavanja, seminar
- Računalniške vaje

### Learning and teaching methods:

- Lectures, seminary
- Computer exercises

### Načini ocenjevanja:

### Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)  
Seminarska naloga  
Pisni izpit – teoretični del  
Projekt – praktični del

Delež (v %) /  
Weight (in %)  
20%  
40%  
40%

Type (examination, oral, coursework, project):  
Seminary work  
Written exam – theoretical part  
Project – practical part

Vsaka izmed naštetih obveznosti mora

Each of the mentioned commitments

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------|
| biti opravljena s pozitivno oceno.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | must be assessed with a passing grade.                                          |
| Pozitivna ocena pri seminarski nalogi in projektu je pogoj za pristop k izpitu.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | Passing grade of the seminary work and project is required for taking the exam. |
| <b>Reference nosilca / Lecturer's references:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                 |
| <p>1. TARANENKO, Andrej, VESEL, Aleksander. 1-factors and characterization of reducible faces of plane elementary bipartite graphs. <i>Discuss. Math., Graph Theory</i>, 2012, vol. 32, no. 2, str. 289-297, doi: <a href="https://doi.org/10.7151/dmgt.1607">10.7151/dmgt.1607</a>. [COBISS.SI-ID <a href="https://www.cobiss.si/id/19104264">19104264</a>]</p> <p>2. TARANENKO, Andrej, ŽIGERT, Petra. Resonant sets of benzenoid graphs and hypercubes of their resonance graphs. <i>MATCH Commun. Math. Comput. Chem. (Krag.)</i>, 2012, vol. 68, no. 1, str. 65-77. <a href="http://www.pmf.kg.ac.rs/match/content68n1.htm">http://www.pmf.kg.ac.rs/match/content68n1.htm</a>. [COBISS.SI-ID <a href="https://www.cobiss.si/id/16051990">16051990</a>]</p> <p>3. KLAVŽAR, Sandi, SALEM, Khaled, TARANENKO, Andrej. Maximum cardinality resonant sets and maximal alternating sets of hexagonal systems. <i>Comput. math. appl. (1987)</i>. [Print ed.], 2010, vol. 59, no. 1, str. 506-513. <a href="http://dx.doi.org/10.1016/j.camwa.2009.06.011">http://dx.doi.org/10.1016/j.camwa.2009.06.011</a>. [COBISS.SI-ID <a href="https://www.cobiss.si/id/15383641">15383641</a>]</p> <p>4. TARANENKO, Andrej, VESEL, Aleksander. Characterization of reducible hexagons and fast decomposition of elementary benzenoid graphs. <i>Discrete appl. math.</i>. [Print ed.], 2008, vol. 156, iss. 10, str. 1711-1724. <a href="http://dx.doi.org/10.1016/j.dam.2007.08.029">http://dx.doi.org/10.1016/j.dam.2007.08.029</a>, doi: <a href="https://doi.org/10.1016/j.dam.2007.08.029">10.1016/j.dam.2007.08.029</a>. [COBISS.SI-ID <a href="https://www.cobiss.si/id/16140552">16140552</a>]</p> <p>5. TARANENKO, Andrej, VESEL, Aleksander. On elementary benzenoid graphs: new characterization and structure of their resonance graphs. <i>MATCH Commun. Math. Comput. Chem. (Krag.)</i>, 2008, #Vol. #60, #no. #1, str. 193-216, ilustr. [COBISS.SI-ID <a href="https://www.cobiss.si/id/1939989">1939989</a>]</p> |  |                                                                                 |