



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

**UČNI NAČRT PREDMETA / COURSE SYLLABUS**

<b>Predmet:</b>	<b>Izbrana poglavja iz diskretne matematike</b>
<b>Course title:</b>	<b>Topics in Discrete Mathematics</b>

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 3. stopnja		1. ali 2.	1. ali 3. ali 4.
Mathematics, 3 <sup>rd</sup> cycle		1 <sup>st</sup> or 2 <sup>nd</sup>	1 <sup>st</sup> or 3 <sup>rd</sup> or 4 <sup>th</sup>

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30					150	6

Nosilec predmeta / Lecturer:

Jeziki / Languages:   
Predavanja / Lectures:  
Vaje / Tutorial:

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

Poznanje temeljnih konceptov diskretne matematike: klasične in algebraične kombinatorike, teorije grafov, teorije načrtov. Poznavanje osnov linearne algebre, teorije grup, kombinatorike delno urejenih množic.

**Prerequisites:**

Basic knowledge of fundamental concepts of discrete mathematics: classical and algebraic combinatorics, graph theory, design theory. Knowledge of basic linear algebra, group theory, combinatorics of partially ordered sets.

**Vsebina:**

Izbrana so posebna poglavja iz teorije grafov, klasične in algebraične kombinatorike, uporaba diskretne matematike, ali katerega drugega modernega področja diskretne matematike. Izbira poglavij je odvisna od interesa in raziskovalne usmerjenosti študentov ter trendov v sodobni diskretni matematiki. Spodaj navedena literatura praviloma služi le kot osnova in je nadgrajena z bolj specializiranimi teksti.

**Content (Syllabus outline):**

Special topics in graph theory, classical and algebraic combinatorics, applications of discrete mathematics, or some other area of contemporary discrete mathematics are chosen. The choice depends on students' interests and their research orientation, as well as on trends in modern discrete mathematics. The literature below in principle serves only as a basis, and is combined with more specialized texts.

**Temeljni literatura in viri / Readings:**

- M. Aigner, Discrete Mathematics, American Mathematical Society, Providence, 2007.
- R. Diestel, Graph Theory, 5th Edition, Springer, Berlin, 2016.
- C. Godsil, G. Royle, Algebraic Graph Theory, Springer, New York, 2001.
- G. Grätzer, General Lattice Theory, 2nd Edition, Birkhäuser, Basel, 2003.
- R. Hammack, W. Imrich, S. Klavžar, Handbook of Product Graphs, 2nd Edition, CRC Press, Boca Raton, 2016.
- P. Hell, J. Nešetřil, Graphs and Homomorphisms, Oxford University Press, Oxford, 2004.
- J. H. van Lint, R. M. Wilson, A Course in Combinatorics, Cambridge University Press, Cambridge, 2001.

**Cilji in kompetence:**

- študentu predstaviti izbrano področje moderne diskretne matematike, kar lahko služi kot uvod v raziskovalno delo;
- Doseči poglobljeno razumevanje teoretskih in metodoloških konceptov s področja diskretne matematike
- Razviti sposobnost za samostojno reševanje najzahtevnejših problemov iz diskretne matematike
- Zmožnost razvijanja kritične refleksije na področju diskretne matematike

**Objectives and competences:**

- to present a selected area of modern discrete mathematics, which can serve as an introduction to student's research work;
- To achieve a deeper understanding of theoretical and methodological concepts of discrete mathematics
- To develop the ability for solving the most challenging problems in discrete mathematics
- Ability to develop critical reflection in discrete mathematics

**Predvideni študijski rezultati:****Znanje in razumevanje:**

- poglobljeno znanje posebnega področja diskretne matematike;
- poglobljeno razumevanje nekaterih posebnih pojmov diskretne matematike.

**Prenosljive/ključne spretnosti in drugi atributi:**

- podlaga za raziskovalno delo na posebnem področju diskretne matematike.

**Intended learning outcomes:****Knowledge and understanding:**

- a deeper knowledge of a special topic in discrete mathematics;
- a deeper understanding of some special concepts in discrete mathematics.

**Transferable/Key Skills and other attributes:**

- a basis for research in a special area of discrete mathematics.

**Metode poučevanja in učenja:**

- predavanja;
- priprava seminarja;
- konzultacije;
- samostojni študij.

**Learning and teaching methods:**

- lectures;
- seminar work;
- consultations;
- self-study.

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Seminarska naloga	50 %	Seminar paper
Teoretični izpit	50 %	Theoretical exam

**Reference nosilca / Lecturer's references:**

1. BREŠAR, Boštjan, HEDŽET, Jaka. Bootstrap percolation in strong products of graphs. *The Electronic journal of combinatorics*. [Online ed.]. 2024, vol. 31, iss. 4, article no. p4.35, 22 str. ISSN 1077-8926. <https://www.combinatorics.org/ojs/index.php/eljc/article/view/v31i4p35>, DOI: [10.37236/11826](https://doi.org/10.37236/11826). [COBISS.SI-ID [215693827](https://www.cobiss.si/id/215693827)], [Odprti dostop, JCR, kategorija: 1A2]
2. BREŠAR, Boštjan, YERO, Ismael G. Lower (total) mutual-visibility number in graphs. *Applied mathematics and computation*. [Print ed.]. Mar. 2024, vol. 465, [article no.] 128411, 11 str., ilustr. ISSN 0096-3003. <https://www.sciencedirect.com/science/article/pii/S0096300323005805>, DiRROS - Digitalni repozitorij raziskovalnih organizacij Slovenije, DOI: [10.1016/j.amc.2023.128411](https://doi.org/10.1016/j.amc.2023.128411). [COBISS.SI-ID [169849091](https://www.cobiss.si/id/169849091)], [JCR] kategorija: 1A1
3. BREŠAR, Boštjan, HENNING, Michael A. Best possible upper bounds on the restrained domination number of cubic graphs. *Journal of graph theory*. Aug. 2024, vol. 106, iss. 4, str. 763–815, graf. prikazi. ISSN 0364-9024. <https://onlinelibrary.wiley.com/doi/10.1002/jgt.23095>, DiRROS - Digitalni repozitorij raziskovalnih organizacij Slovenije, DOI: [10.1002/jgt.23095](https://doi.org/10.1002/jgt.23095). [COBISS.SI-ID [199137795](https://www.cobiss.si/id/199137795)], [JCR] kategorija: 1A2
4. BREŠAR, Boštjan, JAKOVAC, Marko, ŠTESL, Daša. Indicated coloring game on Cartesian products of graphs. *Discrete applied mathematics*. [Print ed.]. Jan. 2021, vol. 289, str. 320-326. DOI: [10.1016/j.dam.2020.11.007](https://doi.org/10.1016/j.dam.2020.11.007). [COBISS.SI-ID [41803267](https://www.cobiss.si/id/41803267)], [JCR] kategorija: 1A3
5. BREŠAR, Boštjan, ŠTESL, Daša. The independence coloring game on graphs. *Quaestiones mathematicae*. [Print ed.]. 2021, vol. , no. , str. 1-22. DOI: [10.2989/16073606.2021.1947919](https://doi.org/10.2989/16073606.2021.1947919). [COBISS.SI-ID [70914307](https://www.cobiss.si/id/70914307)], [JCR] kategorija: 1A1

