



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Uvod v matematiko
Course title:	Introduction to Mathematics

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 / Compulsory

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
30		45			75	5

Nosilec predmeta / Lecturer:

dr. Tanja Dravec

Jeziki /

Predavanja / Lectures: slovenski / Slovenian

Languages:

Vaje / Tutorial: slovenski / Slovenian

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

Prerequisites:

Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno.

Pozitivna ocena pri praktičnem izpitu je pogoj za pristop k teoretičnemu izpitu.

Each of the mentioned commitments must be assessed with a passing grade.

Passing grade of the practical exam is required for taking the theoretical exam.

Vsebina:

- Pojem izreka: izreki tipa “če-potem” in “če in samo če”, osnovne logične povezave, poimenovanje izrekov (lema, trditev, izrek, posledica). Pojem definicije v matematiki. Primeri dokazov na primerih iz elementarne matematike. Pojem protiprimera. Metode dokazovanja: direktna izpeljava, dokaz s protislovjem, dokaz z najmanjšim protiprimerom, matematična indukcija. Matematični poskusi. Heuristika.
- Osnovni pojmi matematične logike. Množice: načini zapisovanja množic, osnovne operacije z množicami. Relacije, ekvivalenčne relacije.
- Realna števila. Ravninski koordinatni sistem. Elementarne funkcije: linearne, kvadratne, polinomi, racionalne, eksponentne, logaritemske, trigonometrične in njihovi inverzi.

Content (Syllabus outline):

- The concept of a theorem: “if-then” theorems, “if and only if theorems”, basic logic connections, naming theorems (lemma, proposition, theorem, corollary). The concept of a definition in mathematics. Examples of proofs from elementary mathematics. Proof methods: direct proofs, proof by contradiction, proof by smallest counterexample, mathematical inductions. Experiments in mathematics. Heuristics.
- The basic notions of mathematical logic. Sets: the methods of denoting sets, the basic operations on sets. Relations, equivalence relations.
- Real numbers. Plane coordinate system. Elementary functions: linear, quadratic, polynomial, rational, exponential, logarithmic, trigonometric and their inverses.

Temeljni literatura in viri / Readings:

1. Pólya, G. (1989). *Kako rešujemo matematične probleme* ([3. natis], Let. 40, str. 272). Društvo matematikov, fizikov in astronomov SRS.
2. Scheinerman, E. R. (2006). *Mathematics: a discrete introduction* (2nd ed., str. XXVII, 561). Thomson Brooks/Cole.
3. Prijatelj, N. (1996). *Matematične strukture. 1, Množice, relacije, funkcije* (5. izd., Let. 9, str. 216). Društvo matematikov, fizikov in astronomov Slovenije.

Dodatna literatura / Additional Readings:

1. Graham, R. L. (1994). *Concrete mathematics: a foundation for computer science*. Pearson Education India.

Cilji in kompetence:

Spoznati osnovne principi matematičnega mišljenja in dela. Spoznati matematični formalizem in dokazovanje v matematiki ter načine kreativnega reševanja matematičnih problemov. Spoznati elementarne funkcije.

Objectives and competences:

To know basic principles of mathematical thinking and work. To know mathematical formalism and methods of proofs in mathematics, as well as methods of creative solving of mathematical problems. To know elementary functions.

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

- Razumevanje temeljnih principov matematike.
 - Dokazovanje preprostejših izrekov z različnimi metodami.
 - Sposobnost za uporabo heurističnih metod.
 - Sposobnost dela z elementarnimi funkcijami.
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- Pridobljena znanja so osnova za vse druge matematične predmete.

Metode poučevanja in učenja:

- Predavanja
- Seminarske vaje
- Individualno delo

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

- Ability to understand basic principles of mathematics.
 - Proving simpler theorems using different methods.
 - Ability to use heuristic methods.
 - Ability to work with elementary functions.
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- The obtained knowledge forms a foundation for all other mathematical subjects.

Learning and teaching methods:

- Lectures
- Tutorials
- Individual work

Delež (v %) /

Weight (in %)

Načini ocenjevanja:**Assessment:**

Praktični izpit	50 %	Practical exam
	50 %	Theoretical exam
Teoretični izpit		

Reference nosilca / Lecturer's references:

1. BREŠAR, Boštjan, DRAVEC, Tanja, KLESZCZ, Elżbieta. Uniquely colorable graphs up to automorphisms. *Applied mathematics and computation*. [Print ed.]. Aug. 2023, vol. 450, art. 128007 (10 str.). ISSN 0096-3003. <https://www.sciencedirect.com/science/article/pii/S0096300323001765>, DOI: [10.1016/j.amc.2023.128007](https://doi.org/10.1016/j.amc.2023.128007).
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](https://doi.org/10.7151/dmgt.2373).
3. DRAVEC, Tanja, JAKOVAC, Marko, KOS, Tim, MARC, Tilen. On graphs with equal total domination and Grundy total domination numbers. *Aequationes mathematicae*. Feb. 2022, vol. 96, iss. 1, 137-146. ISSN 0001-9054. <https://link.springer.com/article/10.1007/s00010-021-00776-z>, DOI: [10.1007/s00010-021-00776-z](https://doi.org/10.1007/s00010-021-00776-z).
4. BREŠAR, Boštjan, DRAVEC, Tanja, GORZKOWSKA, Aleksandra, KLESZCZ, Elżbieta. Graphs with a unique maximum independent set up to automorphisms. *Discrete applied mathematics*. [Print ed.]. Aug. 2022, vol. 317, str. 124-135. ISSN 0166-218X. <https://www.sciencedirect.com/science/article/pii/S0166218X22001251>, DOI: [10.1016/j.dam.2022.04.003](https://doi.org/10.1016/j.dam.2022.04.003).
5. DRAVEC, Tanja. On the toll number of a graph. *Discrete applied mathematics*. [Print ed.]. Nov. 2022, vol. 321, str. 250-257. ISSN 0166-218X. DOI: [10.1016/j.dam.2022.07.006](https://doi.org/10.1016/j.dam.2022.07.006).

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