



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
Predmet:	Teorija množic II					
Course title:	Set Theory II					
Študijski program in stopnja Study programme and level	Študijska smer Study field			Letnik Academic year	Semester Semester	
Matematika				1.	2.	
Mathematics				1.	2.	
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		30			90	5
Nosilec predmeta / Lecturer:				Iztok Banič		
Jeziki /	Predavanja / Lectures:	SLOVENSKO/SLOVENE				
Languages:	Vaje / Tutorial:	SLOVENSKO/SLOVENE				
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Jih ni.				There are none.		
Vsebina:				Content (Syllabus outline):		
Matematična logika – izjavni račun, predikatni račun. Osnovne operacije z družinami množic. Dobra ureditev. Transfinitna indukcija. Matematična indukcija kot poseben primer transfinitne indukcije.				Mathematical logic – propositional calculus, predicate calculus. The basic operations on families of sets. Well order. Transfinite induction. Mathematical induction as a special case of transfinite induction.		
Množice funkcij.				Sets of functions.		
Končne in neskončne, števne in neštevne množice. Karakterizacije števnih množic, karakterizacije neskončnih množic.				Finite and infinite, countable and uncountable sets. Characterizations of countable sets, characterizations of infinite sets.		
				Cardinal numbers and cardinal arithmetic. Cantor-Schröder-Bernstein's theorem.		

<p>Kardinalna števila in kardinalna aritmetika. Cantor-Schröder-Bernsteinov izrek.</p> <p>Ordinalna števila in ordinalna aritmetika. Izrek o trihotomiji.</p> <p>Aksiom izbire. Zermelov izrek. Zornova lema. Primeri uporabe.</p> <p>Zermelo-Fraenkelovi aksiomi.</p>	<p>Ordinal numbers and ordinal arithmetic. Law of trichotomy.</p> <p>Axiom of choice. Zermelo's theorem. Zorn's lemma. Examples of applications.</p> <p>Zermelo-Fraenkel's axioms.</p>
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Temeljni literatura in viri / Readings:

N.Prijatelj: Matematične strukture I, Ljubljana, Društvo matematikov, fizikov in astronomov Slovenije, 1996
 R.R.Stoll: Set theory and logic, New York, Dover Publications, 1979
 S.Lipschutz: Schaum's outline of theory and problems of set theory and related topics, New York (etc.), McGraw-Hill, 1998
 P. Papić: Uvod u teoriju skupova, HMD, Zagreb, 2000

Cilji in kompetence:

Obvladati naprednejše pojme in rezultate iz matematične logike in teorije množic.

Objectives and competences:

Students learn how to use the advanced notions and results of mathematical logic and set theory.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Uporaba pojmov matematične logike (izjava, predikat, logične operacije, kvantifikatorja)
- Uporaba pojmov in rezultatov iz teorije množic (množice, operacije z množicami in družinami množic, relacije, funkcije, kardinalna in ordinalna števila ter kardinalna in ordinalna aritmetika, aksiom izbire in njemu ekvivalentni rezultati).

Prenesljive/ključne spretnosti in drugi atributi:

- Pridobljena znanja so osnova za vse druge matematične predmete.

Intended learning outcomes:

Knowledge and Understanding:

Be able to use notions of mathematical logic (propositions, predicates, logical operations, quantifiers)

Be able to use notions and results of set theory (sets, operations on sets and families of sets, relations, functions, cardinal and ordinal numbers, cardinal and ordinal arithmetic, axiom of choice and equivalent results)

Transferable/Key Skills and other attributes:

- The obtained knowledge forms a foundation for all the other mathematical subjects.

Metode poučevanja in učenja:

- Predavanja
- Teoretične vaje

Learning and teaching methods:

Lectures
Theoretical exercises

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

Izpit:

Pisni izpit – problemi
Ustni izpit – teorija

Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.

Pozitivna ocena pri pisnem izpitu - problemi je pogoj za pristop k ustnemu izpitu – teorija.

Delež (v %) /
Weight (in %)

50%
50%

Assessment:

Type (examination, oral, coursework, project):

Exams:

Written exam – problems
Oral exam – theory

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

Passing grade of the written exam – problems is required for taking the oral exam – theory.

Pisni izpit – problemi se lahko nadomesti z vsaj dvema delnima testoma (ki sta sprotni obveznosti).		Written exam – problems can be replaced by at least two mid-term tests.
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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](https://doi.org/10.46298/dmtcs.9859). [COBISS.SI-ID [148408835](#)]
financer: ARRS, Programi, P1-0297, SI, Teorija grafov; ARRS, Projekti, J1-1693, SI, Sodobni in novi metrični koncepti v teoriji grafov; ARRS, Programi, P1-0285, SI, Algebra, diskretna matematika, verjetnostni račun in teorija iger
- 2.** BANIČ, Iztok, ERCEG, Goran, KENNEDY, Judy A. A transitive homeomorphism on the Lelek fan. *Journal of difference equations and applications*. 2023, 26 str. ISSN 1023-6198. DOI: [10.1080/10236198.2023.2208242](https://doi.org/10.1080/10236198.2023.2208242). [COBISS.SI-ID [151598851](#)]
financer: ARRS, Programi, P1-0285, SI, Algebra, diskretna matematika, verjetnostni račun in teorija iger
- 3.** BANIČ, Iztok, ERCEG, Goran, KENNEDY, Judy A. The Lelek fan as the inverse limit of intervals with a single set-valued bonding function whose graph is an arc. *Mediterranean journal of mathematics*. Jun. 2023, vol. 20, iss. 3, article no. 159, 24 str. ISSN 1660-5446. DOI: [10.1007/s00009-023-02323-3](https://doi.org/10.1007/s00009-023-02323-3). [COBISS.SI-ID [148424195](#)]
financer: ARRS, Programi, P1-0285, SI, Algebra, diskretna matematika, verjetnostni račun in teorija iger
- 4.** BANIČ, Iztok, ERCEG, Goran, GREENWOOD, Sina, KENNEDY, Judy A. Transitive points in CR-dynamical systems. *Topology and its Applications*. [Print ed.]. 2023, vol. 326, [article no.] 108407, 31 str. ISSN 0166-8641. DOI: [10.1016/j.topol.2023.108407](https://doi.org/10.1016/j.topol.2023.108407). [COBISS.SI-ID [150126083](#)]
financer: ARRS, Programi, P1-0285, SI, Algebra, diskretna matematika, verjetnostni račun in teorija iger; ARRS, Projekti, BI-US/22-24-094, SI
- 5.** BANIČ, Iztok, ERCEG, Goran, KENNEDY, Judy A. Mapping theorems for inverse limits with set-valued bonding functions. *Bulletin of the Malaysian Mathematical Sciences Society*. Nov. 2022, vol. 45, iss. 6, str. 2905-2940. ISSN 0126-6705. DOI: [10.1007/s40840-022-01307-y](https://doi.org/10.1007/s40840-022-01307-y). [COBISS.SI-ID [111923203](#)]
financer: ARRS, Programi, P1-0285, SI, Algebra, diskretna matematika, verjetnostni račun in teorija iger