



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: Geometrija

Course title: Geometry

**Študijski program in
stopnja**

Študijska smer

Letnik

Semester

**Study programme and
level**

Study field

**Academic
year**

Semester

Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	5.	9.
Five-year master's degree program Subject Teacher	/		

Vrsta predmeta / Course type

Izbirni / Elective

Univerzitetna koda predmeta / University course code:

Predavanja a Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45	-	30	-	-	105	6

**Nosilec predmeta /
Lecturer:**

Tanja Dravec

Jeziki / Predavanja / Lectures: slovenski / Slovene

Languages / Vaje / Tutorial: slovenski / Slovene

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

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

Pozitivna ocena pri pisnem izpitu je pogoj za pristop k ustnemu izpitu.

Prerequisites:

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

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

Vsebina:

Hilbertov aksiomatski sistem za absolutno geometrijo: aksiomi povezave, urejenosti, skladnosti in zveznosti.
Aksiom o vzporednicah in njegovi ekvivalenti.
Afini prostori, affine transformacije, aksiomatsko definirana afina geometrija.
Aksiomi projektivne geometrije, Desarguesov izrek. Harmonični elementi.
Homogene in nehomogene koordinate v projektivni ravnini. Projektivne transformacije.
Aksiom Lobačevskega. Hiperbolična razdalja in geodetke.

Content (Syllabus outline):

Hilbert's axiomatic system for absolute geometry: incidence axioms, ordering axioms, congruence axioms and continuity axioms.
Parallel postulate and its equivalents.
Affine spaces, affine transformations, axiomatic definition of affine geometry.
Axioms of projective geometry, Desargues theorem. Harmonic elements.
Homogeneous and non-homogeneous coordinate systems in the projective plane.
Projective transformations.
Lobachevski axiom. Hyperbolic distance and geodesic lines.

Temeljni literatura in viri / Readings:

1. Coxeter, H. S. M. (1993). *The real projective plane: with an appendix for mathematica by George Beck: PC Version (Diskette provided)* (3rd ed., str. XIII, 222). Springer.
2. Mitrović, M. (2009). *Projektivna geometrija* (Let. 88, str. 150). DMFA - založništvo.
3. Vidav, I. (1981). *Afina in projektivna geometrija* (Let. 15, str. 170). Društvo matematikov, fizikov in astronomov SRS.
4. Rosenbaum, R. A. (1963). *Introduction to projective geometry and modern algebra* (str. VIII, 344). Addison-Wesley.
5. Pagon, D. (1995). *Osnove evklidske geometrije* (str. 124). DZS.
6. Berger, M. (1987). *Geometry I: with 426 figures* (str. XIII, 427). Springer.

Dodatna literatura / Additional Readings:

1. Ayres, F. (1967). *Schaum's outline of theory and problems of projective geometry* (str. 243). McGraw-Hill.

1.

Cilji in kompetence:

Študentje spoznajo aksiomatsko zasnovo evklidske geometrije ter osnove projektivne, afine in neevklidske geometrije.

Objectives and competences:

Students get familiar with axiomatic approach to Euclidean geometry, the basic concepts of projective, affine and non-euclidean geometry.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumevanje Hilbertovega aksiomatskega sistema za evklidsko geometrijo.
- Poznavanje osnovnih pojmov projektivne, afine in neevklidskih geometrij.
- Pridobljena znanja prispevajo k razumevanju vsebin drugih geometrijsko-topoloških predmetov.

Intended learning outcomes:

Knowledge and understanding:

- To understand the Hilbert axiomatic system for Euclidean geometry.
- To recognize the basic concepts of projective, affine and non-euclidean geometries.
- The obtained knowledge contributes to better understanding of the content of other subjects in the area of geometry and topology.

Metode poučevanja in učenja:

- Predavanja
- Seminarske vaje
- Individualno delo

Learning and teaching methods:

- Lectures
- Exercises
- Individual work

Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

Pisni izpit		Written exam
Ustni izpit		Oral exam
	50%	
	50%	

Opombe:

Pisni izpit se lahko nadomesti s kolokviji v enakem deležu 50%.

Comments:

Written exam can be replaced by written midterm examination in the weight of 50%.

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).