Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

| UČNI NAČRT PREDMETA / COURSE SYLLABUS | |
|---|---|
| **Predmet:** | **Geometrija** |
| **Course title:** | **Geometry** |

| Študijski program in stopnja<br>Study programme and level | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|---|---|---|---|
| **Enovit magistrski študijski program druge stopnje Predmetni učitelj** | **/** | **5.** | **9.** |
| **Five-year master's degree program Subject Teacher** | **/** | | |

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| **Vrsta predmeta / Course type** | Izbirni / Elective |
| **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** | **-** | **-** | **120** | **6** |

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| **Nosilec predmeta / Lecturer:** | Tanja Dravec |

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| **Jeziki / Languages:** | **Predavanja / Lectures:** | **slovenski / Slovene** |
| | **Vaje / Tutorial:** | **slovenski / Slovene** |

| Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti: | Prerequisits: |
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| / | / |

**Vsebina:**

Hilbertov aksiomatski sistem za absolutno geometrijo: aksiomi povezave, urejenosti, skladnosti in zveznosti.
Aksiom o vzporednicah in njegovi ekvivalenti. Aritmetični model dvorazsežne evklidske geometrije.
Afini prostori, afine 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. The arithmetic model of Euclidean plane.
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 geodetic lines.

**Temeljni literatura in viri / Readings:**

H. S. M. Coxeter, The real projective plane, Springer 1993
R. Rosenbaum, Introduction to projective geometry and modern algebra, Addison-Wesley 1963
D. Pagon, Osnove evklidske geometrije, DZS, Ljubljana 1995
F. Ayres, Schaum's Outline of Theory and Problems of Projective Geometry, McGraw-Hill, 1967
M. Berger, Geometry I, Springer-Verlag Berlin Heidelberg, 1987

**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.

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| **Metode poučevanja in učenja:** | **Learning and teaching methods:** |
|---|---|
| • Predavanja<br>• Seminarske vaje<br>• Individualno delo | • Lectures<br>• Excersises<br>• Individual work |

| **Načini ocenjevanja:** | Delež (v %) / Weight (in %) | **Assessment:** |
|---|---|---|
| Način (pisni izpit, ustno izpraševanje, naloge, projekt):<br><br>Pisni izpit – praktični del<br>Ustni izpit – teoretični del<br><br>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.<br><br>Pisni izpit – praktični del se lahko nadomesti z dvema delnima testoma (sprotni obveznosti).<br><br>Pozitivna ocena pri pisnem testu je pogoj za pristop k ustnemu izpitu. | **50%**<br>**50%** | Type (examination, oral, coursework, project):<br><br>Written exam – practical part<br>Oral exam – theoretical part<br><br>Each of the mentioned commitments must be assessed with a passing grade.<br><br>Written exam – practical part can be replaced by two partial tests (mid-term testing).<br><br>Passing grade of the written test is required for taking the oral exam. |

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


1. GOLOGRANC, Tanja, REPOLUSK, Polona. Toll number of the strong product of graphs. *Discrete Mathematics*, 2019, vol. 342, iss. 3, str. 807-814. [COBISS.SI-ID 24329224]

2. GOLOGRANC, Tanja. Steiner convex sets and Cartesian product. *Bulletin of the Malaysian Mathematical Sciences Society*, 2018, vol. 41, iss. 2, str. 627-636. [COBISS.SI-ID 24621832]

3. BREŠAR, Boštjan, GOLOGRANC, Tanja, KOS, Tim. Convex and isometric domination of (weak) dominating pair graphs. *Theoretical computer science*, 2018, vol. 730, str. 32-43. [COBISS.SI-ID 18371161]

4. GOLOGRANC, Tanja, JAKOVAC, Marko, PETERIN, Iztok. The security number of lexicographic products. *Quaestiones mathematicae*, 2018, vol. 41, iss. 5, str. 601-613. [COBISS.SI-ID 18407257]

5. BREŠAR, Boštjan, BUJTÁS, Csilla, GOLOGRANC, Tanja, KLAVŽAR, Sandi, KOŠMRLJ, Gašper, PATKÓS, Balázs, TUZA, Zsolt, VIZER, Máté. Grundy dominating sequences and zero forcing sets. *Discrete optimization*, 2017, vol. 26, str. 66-77. [COBISS.SI-ID 18163289]