

| UČNI NAČRT PREDMETA / COURSE SYLLABUS | | | | | | | |
|--|---------------------------|---|------------------------------|------------------------------------|---|-----------------------------|--|
| Predmet: | | Uvod v algebraično geometrijo | | | | | |
| Course title: | | Introduction to algebraic geometry | | | | | |
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| Študijski program in stopnja Study programme and level | | Študijska smer Study field | | Letnik Academic year | | Semester Semester | |
| Magistrski študijski program Finančna matematika | | ni smeri | | 1 ali 2 | | prvi ali drugi | |
| Master's study programme Financial Mathematics | | none | | 1 or 2 | | first or second | |
| Vrsta predmeta / Course type | | | | izbirni | | | |
| | | | | | | | |
| Univerzitetna koda predmeta / University course code: | | | | M2310 | | | |
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| Predavanja Lectures | Seminar Seminar | Vaje Tutorial | Klinične vaje work | Druge oblike študija | Samost. delo Individ. work | ECTS | |
| 45 | | 30 | | | 105 | 6 | |
| Nosilec predmeta / Lecturer: | | | | prof. Tomaž Košir | | | |
| Jeziki / Languages: | | Predavanja / Lectures: slovenski/Slovene, angleški/English | | | | | |
| | | Vaje / Tutorial: slovenski/Slovene, angleški/English | | | | | |
| Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti: | | | | Prerequisites: | | | |
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| Vsebina: | | | | Content (Syllabus outline): | | | |

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| <p>Osnovni del:</p> <p>Afine raznoterosti. Hilbertov izrek o ničlah. Kolobar polinomskih funkcij. Racionalne funkcije.</p> <p>Lokalne lastnosti ravninskih krivulj.</p> <p>Projektivne raznoterosti. Regularne in racionalne funkcije.</p> <p>Projektivne ravninske krivulje. Bezoutov izrek. Izrek Maxa Noetherja.</p> <p>Preslikave med raznoterostmi. Resolucije singularnosti krivulj.</p> <p>Hilbertov polinom in Hilbertova funkcija.</p> <p>Delitelji na raznoterostih.</p> <p>Krivulje. Ravninske kubične krivulje. Linearni sistemi na krivulji. Projektivne vložitve krivulj.</p> <p>Izbirne vsebine:</p> <p>Riemann-Rochov izrek.</p> | <p>Fundamental part:</p> <p>Affine varieties. Hilbert Nullstellensatz.</p> <p>Ring of polynomial functions. Rational functions.</p> <p>Local properties of plane curves.</p> <p>Projective varieties. Regular and rational functions.</p> <p>Projective plane curves. Bezout's Theorem.</p> <p>Max Noether Theorem.</p> <p>Affine and rational maps. Resolutions of singularities.</p> <p>Hilbert polynomial and Hilbert function.</p> <p>Divisors on varieties.</p> <p>Curves. Plane cubic curves. Linear systems on curves. Projective embeddings of curves.</p> <p>Elective topics:</p> <p>Riemann-Roch Theorem.</p> |
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Temeljni literatura in viri / Readings:

- B. Hassett. Introduction to algebraic geometry. Cambridge Univ. Press, 2007.
- M. C. Beltrametti, E. Carletti, D. Gallarati, G. Monti Bragadin. Lectures on Curves, Surfaces and Projective Varieties. A Classical View of Algebraic Geometry, EMS Text-books in Mathematics, 2009.
- I. Shafarevich: Basic Algebraic Geometry I : Varieties in Projective Space, 2nd edition, Springer, Berlin, 1994.
- K. Hulek: Elementary Algebraic Geometry, AMS, Providence, 2003.
- W. Fulton: Algebraic Curves, Addison-Wesley, Redwood City, 1989.
- J. Harris: Algebraic Geometry : A First Course, Springer, New York, 1995.

Cilji in kompetence:

Objectives and competences:

Študent se spozna z osnovnimi pojmi in izreki algebraične geometrije.

Student masters basic concepts and tools of algebraic geometry.

Predvideni študijski rezultati:

Znanje in razumevanje: Poznavanje pojmov in izrekov algebraične geometrije in njihovo prepoznavanje v drugih vejah matematike. Uporaba: V področjih matematike, ki delajo z geometričnimi objekti, v teoretični fiziki, in drugje.

Refleksija: Razumevanje teorije na podlagi primerov in uporabe.

Prenosljive spretnosti – niso vezane le na en predmet: Formulacija problemov v primernem jeziku, reševanje in analiza dobljenih rezultatov na primerih, prepoznavanje algebraičnih struktur v geometriji.

Intended learning outcomes:

Knowledge and understanding: Understanding of basic concepts and theorems of algebraic geometry, and their role in some other areas. Application: In the areas of mathematics that deal with geometric objects, in theoretical physics, and elsewhere.

Reflection: Understanding the theory on the basis of examples and applications.

Transferable skills: Formulation and solution of problems in an appropriate setup, solution and analysis of the results in examples, recognizing algebraic structure in geometric objects.

Metode poučevanja in učenja:

predavanja, vaje, domače naloge, konzultacije

Learning and teaching methods:

Lectures, exercises, homeworks, consultations

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):
izpit iz vaj (2 kolokvija ali pisni izpit)

Delež (v %) /
Weight (in %)

50%
50%

Assessment:

Type (examination, oral, coursework, project):
2 midterm exams instead of written exam, written exam

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| ustni izpit | | oral exam |
| Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL) | | Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL) |

Reference nosilca / Lecturer's references:

Tomaž Košir:

– GRUNENFELDER, Luzius, KOŠIR, Tomaž. Geometric aspect of multiparameter spectral theory. Transactions of the American Mathematical Society, ISSN 0002-9947, 1998, let. 350, št. 6, str. 2525-2546 [COBISS.SI-ID 8449113]

– KOŠIR, Tomaž, SETHURAMAN, B. A. Determinantal varieties over truncated polynomial rings. Journal of Pure and Applied Algebra, ISSN 0022-4049. [Print ed.], 2005, vol. 195, no. 1, str. 75-95 [COBISS.SI-ID 13266265]

– BUCKLEY, Anita, KOŠIR, Tomaž. Plane curves as Pfaffians. Annali della Scuola normale superiore di Pisa, Classe di scienze, ISSN 0391-173X, 2011, vol. 10, iss. 2, str. 363-388 [COBISS.SI-ID 15928409]