

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
<b>Predmet:</b>		Uvod v algebraično geometrijo				
<b>Course title:</b>		Introduction to algebraic geometry				
<b>Študijski program in stopnja</b> Study programme and level		<b>Študijska smer</b> Study field		<b>Letnik</b> Academic year	<b>Semester</b> 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	
<b>Vrsta predmeta / Course type</b>				izbirni		
<b>Univerzitetna koda predmeta / University course code:</b>				M2310		
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike študija</b>	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
45		30			105	6
<b>Nosilec predmeta / Lecturer:</b>		prof. Tomaž Košir				
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b> slovenski/Slovene, angleški/English				
		<b>Vaje / Tutorial:</b> slovenski/Slovene, angleški/English				
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		
Osnovni del:  Afine raznoterosti. Hilbertov izrek o ničlah. Kolobar polinomskih funkcij. Racionalne				Fundamental part:  Affine varieties. Hilbert Nullstellensatz.  Ring of polynomial functions. Rational functions.		

<p>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>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:**

Delež (v %) /

Weight (in %)

#### **Assessment:**

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

50%  
50%

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

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]