

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)						
Predmet:		Afina in projektivna geometrija				
Course title:		Affine and projective geometry				
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year	Semester Semester	
Univerzitetni študijski program Finančna matematika		ni smeri		3	drugi	
First cycle academic study programme Financial Mathematics		none		3	second	
Vrsta predmeta / Course type				izbirni / elective		
Univerzitetna koda predmeta / University course code:				M0330		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			90	5
Nosilec predmeta / Lecturer:		prof. dr. Tomaž Košir, prof. dr. Bojan Magajna, doc. dr. Aleš Vavpetič				
Jeziki / Languages:		Predavanja / Lectures:	slovenski / Slovene			
		Vaje / Tutorial:	slovenski / Slovene			
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Vpis v letnik študija.				Enrolment in the programme.		
Opravljen predmet Algebra 1.				Completed course Algebra 1.		
Vsebina:				Content (Syllabus outline):		

<p>Afina geometrija: afini prostori, afine transformacije, osnovni izrek afine geometrije.</p> <p>Projektivna geometrija: projektivni prostori, dualnost, vložitev afine geometrije v projektivno, kolineacije in projektivnosti, osnovni izrek projektivne geometrije, projektivno ogrodje, dvorazmerje, harmonična četverka, perspektivnost.</p> <p>Stožnice v projektivni ravnini: pol in polara, dvorazmerje na stožnici, Pascalov izrek, klasifikacija stožnic.</p> <p>Izbirna vsebina: Klasifikacija izometrij v evklidski ravnini. Leonardov izrek, frizne in tapetne grupe. Končne grupe izometrij v trirazsežnem evklidskem prostoru.</p>	<p>Affine Geometry: affine spaces, affine transformations, the fundamental theorem of affine geometry.</p> <p>Projective Geometry: projective spaces, embedding of affine spaces into projective spaces, collineations and projectivities, the fundamental theorem of projective geometry, projective coordinates, cross-ratio, harmonic ratio, perspectivities.</p> <p>Conics in projective plane: poles and polars, cross-ratio on a conic, Pascal's Theorem, classification of conics.</p> <p>Additional topics: classification of isometries in the Euclidean plane, Leonardo's Theorem, frieze groups and wallpaper groups, finite groups of isometries in Euclidean 3-space.</p>
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Temeljni literatura in viri / Readings:

<p>T. Košir, B. Magajna: Transformacije v geometriji, DMFA-založništvo, Ljubljana, 1997.</p> <p>Vidav: Afina in projektivna geometrija, DMFA-založništvo, Ljubljana, 1981.</p> <p>M. Berger: Geometry I, Springer, Berlin, 2004.</p> <p>M. Berger: Geometry II, Springer, Berlin, 1996.</p> <p>E. G. Rees: Notes on Geometry, Springer, Berlin-New York, 2005.</p> <p>R. A. Rosenbaum: Introduction to Projective Geometry and Modern Algebra, Addison-Wesley, Reading, 1963.</p>

Cilji in kompetence:

<p>Študent spozna osnovne pojme afine in projektivne geometrije. Pri tem uporablja že znana orodja iz algebre in linearne algebre. Razvije geometrijsko intuicijo.</p>
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Objectives and competences:

<p>The main objective is to introduce affine and projective geometry using the tools from algebra and linear algebra. The student develops geometric intuition.</p>

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje: Razumevanje osnovnih pojmov afine in projektivne geometrije. Sposobnost povezovanja znanj iz algebre in analize v uporabi pri geometriji.

Uporaba: Uporaba geometrijskih tehnik pri drugih predmetih in reševanju praktičnih problemov.

Refleksija: Sposobnost povezovanja različnih pristopov: analitičnega, algebraičnega in geometričnega.

Prenosljive spretnosti – niso vezane le na en predmet: Spretnost prenosa teorije v uporabo.

Knowledge and understanding: The understanding of the fundamental notions of affine and projective geometry. The ability to apply the knowledge obtained in algebra and mathematical analysis courses in geometry.

Application: The application of geometric techniques in other subjects and in practice.

Reflection: The ability to connect different approaches: analytical, algebraic and geometric.

Transferable skills: The ability to apply theoretical knowledge in practice.

Metode poučevanja in učenja:

Predavanja, vaje, konzultacije

Learning and teaching methods:

Lectures, exercises, consultations

Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

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

2 kolokvija namesto izpita iz vaj, izpit iz vaj,

izpit iz teorije

ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)

50%

50%

Type (examination, oral, coursework, project):

2 midterm exams instead of written exam, written exam

oral exam

grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

Tomaž Košir:

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]

BINDING, Paul, KOŠIR, Tomaž. Root vectors for geometrically simple two-parameter eigenvalues. *Transactions of the American Mathematical Society*, ISSN 0002-9947, 2004, vol. 356, no. 5, str. 1705-1726. [COBISS.SI-ID 13013081]

KOŠIR, Tomaž. Root vectors for geometrically simple multiparameter eigenvalues. *Integral equations and operator theory*, ISSN 0378-620X, 2004, vol. 48, no. 3, str. 365-396. [COBISS.SI-ID 12895321]

Bojan Magajna:

MAGAJNA, Bojan. Fixed points of normal completely positive maps on $B(H)$. *Journal of mathematical analysis and applications*, ISSN 0022-247X. [Print ed.], 2012, vol. 389, iss. 2, str. 1291-1302. [COBISS.SI-ID 16227673]

BLECHER, David P., MAGAJNA, Bojan. Dual operator systems. *Bulletin of the London Mathematical Society*, ISSN 0024-6093, 2010, vol. 43, iss. 2, str. 311-320. [COBISS.SI-ID 15862617]

MAGAJNA, Bojan. Pointwise approximation by elementary complete contractions. *Proceedings of the American Mathematical Society*, ISSN 0002-9939, 2009, vol. 137, no. 7, str. 2375-2385. [COBISS.SI-ID 15178585]

Aleš Vavpetič:

CENCELJ, Matija, DYDAK, Jerzy, VAVPETIČ, Aleš, VIRK, Žiga. A combinatorial approach to coarse geometry. *Topology and its Applications*, ISSN 0166-8641. [Print ed.], 2012, vol. 159, iss. 3, str. 646-658. [COBISS.SI-ID 16094809]

CENCELJ, Matija, DYDAK, Jerzy, MITRA, Atish, VAVPETIČ, Aleš. Hurewicz-Serre theorem in extension theory. *Fundamenta mathematicae*, ISSN 0016-2736, 2008, vol. 198, no. 2, str. 113-123. [COBISS.SI-ID 14551385]

VAVPETIČ, Aleš, VIRUEL, Antonio. Symplectic groups are N -determined 2-compact groups. *Fundamenta mathematicae*, ISSN 0016-2736, 2006, vol. 192, no. 2, str. 121-139. [COBISS.SI-ID 14185305]

VAVPETIČ, Aleš. *Afina in projektivna geometrija*. Ljubljana: samozal. A. Vavpetič, 2011. VI, 114 str., ilustr. [COBISS.SI-ID 15994969]

