

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
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 Matematika		ni smeri		2	drugi	
First cycle academic study programme Mathematics		none		2	second	
Vrsta predmeta / Course type				izbirni		
Univerzitetna koda predmeta / University course code:				M0215		
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. Aleš Vavpetič, prof. Bojan Peter Magajna, prof. Tomaž Košir				
Jeziki / Languages:		Predavanja / Lectures: slovenski/Slovene				
		Vaje / Tutorial: slovenski/Slovene				
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Opravljen predmet Algebra 1.				Completed course Algebra 1.		
Vsebina:				Content (Syllabus outline):		
Afina geometrija: afini prostori, affine transformacije, osnovni izrek afine geometrije.				Affine Geometry: affine spaces, affine transformations, the fundamental theorem of affine geometry.		

<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>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:

T. Košir, B. Magajna: Transformacije v geometriji, DMFA-založništvo, Ljubljana, 1997.

Vidav: Afina in projektivna geometrija, DMFA-založništvo, Ljubljana, 1981.

M. Berger: Geometry I, Springer, Berlin, 2004.

M. Berger: Geometry II, Springer, Berlin, 1996.

E. G. Rees: Notes on Geometry, Springer, Berlin-New York, 2005.

R. A. Rosenbaum: Introduction to Projective Geometry and Modern Algebra, Addison-Wesley, Reading, 1963.

Cilji in kompetence:

Študent spozna osnovne pojme afine in projektivne geometrije. Pri tem uporablja že znana orodja iz algebre in linearne algebre. Razvije geometrijsko intuicijo.

Objectives and competences:

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

Predvideni študijski rezultati:

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

Intended learning outcomes:

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.

<p>drugih predmetih in reševanju praktičnih problemov.</p> <p>Refleksija: Sposobnost povezovanja različnih pristopov: analitičnega, algebraičnega in geometričnega.</p> <p>Prenosljive spretnosti – niso vezane le na en predmet: Spretnost prenosa teorije v uporabo.</p>	<p>Application: The application of geometric techniques in other subjects and in practice.</p> <p>Reflection: The ability to connect different approaches: analytical, algebraic and geometric.</p> <p>Transferable skills: The ability to apply theoretical knowledge in practice.</p>
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Metode poučevanja in učenja:

<p>Predavanja, vaje, konzultacije</p>

Learning and teaching methods:

<p>Lectures, exercises, consultations</p>

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

<p>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)</p>	<p>50% 50%</p>	<p>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)</p>
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Reference nosilca / Lecturer's references:

<p>Tomaž Košir: – 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] – 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.</p>
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1705-1726 [COBISS.SI-ID 13013081]

– 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]

Bojan Peter Magajna:

– 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]

– 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. 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]

Aleš Vavpetič:

– 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]

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

– 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]