

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
<b>Predmet:</b>		Afina in projektivna geometrija				
<b>Course title:</b>		Affine and projective 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	
Univerzitetni študijski program Matematika		ni smeri		2	drugi	
First cycle academic study programme Mathematics		none		2	second	
<b>Vrsta predmeta / Course type</b>				izbirni		
<b>Univerzitetna koda predmeta / University course code:</b>				M0215		
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike</b> študija	<b>Samost. delo</b> Individ. work	<b>ECTS</b>
30		30			90	5
<b>Nosilec predmeta / Lecturer:</b>		prof. Aleš Vavpetič, prof. Bojan Peter Magajna, prof. Tomaž Košir				
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b>		slovenski/Slovene		
		<b>Vaje / Tutorial:</b>		slovenski/Slovene		
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>		
Opravljen predmet Algebra 1.				Completed course Algebra 1.		
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>		

<p>Afina geometrija: afini prostori, affine transformacije, osnovni izrek affine geometrije.</p> <p>Projektivna geometrija: projektivni prostori, dualnost, vložitev affine 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>
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#### Cilji in kompetence:

<p>Študent spozna osnovne pojme affine 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>
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#### Predvideni študijski rezultati:

#### Intended learning outcomes:

Znanje in razumevanje: Razumevanje osnovnih pojmov affine 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

Delež (v %) /  
 Weight (in %)

**Načini ocenjevanja:**

**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:**

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. 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]