

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
<b>Predmet:</b>		Algebraične krivulje				
<b>Course title:</b>		Algebraic curves				
<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>				M0219		
<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. Pavle Saksida, 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>Afine algebraične krivulje. Nerazcepnost in povezanost.</p> <p>Projektivno zaprtje. Presečna večkratnost med krivuljo in premico. Bezouteva lema.</p> <p>Tangente. Singularnosti.</p> <p>Polare in Hessove krivulje.</p> <p>Dualna krivulja. Plückerjeva formula.</p> <p>Racionalne krivulje. Stožnice.</p> <p>Kubične krivulje.</p> <p>Izrek o rodu in stopnji nesingularne krivulje.</p>	<p>Affine algebraic curves. Irreducibility and connectedness.</p> <p>Projectivization. Multiplicity of intersection between a line and a curve. Bezout lemma.</p> <p>Tangents. Singularity.</p> <p>Polars and Hess curves.</p> <p>Dual curve. Plücker formula.</p> <p>Rational curves , Conics.</p> <p>Cubic curves.</p> <p>Degree-genus formula for nonsingular curves.</p>
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**Temeljni literatura in viri / Readings:**

G. Fisher: Plane Algebraic Curves, AMS, Providence, 2001.

C. G. Gibson: Elementary Geometry of Algebraic Curves, Cambridge Univ. Press, Cambridge, 1998.

M. Reid: Undergraduate Algebraic Geometry, Cambridge Univ. Press, Cambridge, 1988.

K. Hulek: Elementary Algebraic Geometry, AMS, Providence, 2003.

F. Kirwan: Complex Algebraic Curves, Cambridge Univ. Press, Cambridge, 1992.

C. H. Clemens: A Scrapbook of Complex Curve Theory, 2nd edition, AMS, Providence, 2003.

**Cilji in kompetence:**

Je eden od treh osnovnih predmetov, pri katerem študent spozna geometrijski način razmišljanja. Osnovni cilj je spoznati temeljne pojme in lastnosti algebraičnih krivulj.

**Objectives and competences:**

This is one of the three basic courses in which students learn to think geometrically. The basic goal is to understand the basic definitions and properties of algebraic curves.

**Predvideni študijski rezultati:**

**Intended learning outcomes:**

Znanje in razumevanje: Razumevanje povezave med algebraičnimi enačbami in geometrijskimi objekti. Sposobnost obravnave geometrijskih objektov s pomočjo orodij iz teorije polinomov. Poznavanje in razumevanje osnovnih pojmov in definicij iz teorije algebraičnih krivulj in algebraične geometrije.

Uporaba: Algebraični opis objektov, ki se pojavljajo pri problemih v drugih vejah matematike in njene uporabe. Uporaba algebraično-geometrijskih sredstev pri obravnavi teh problemov.

Refleksija: Dojemanje istih objektov (krivulj) z različnih aspektov. Razvijanje geometrijskega razmišljanja pri reševanju problemov iz prakse.

Prenosljive spretnosti – niso vezane le na en predmet: Formulacija problemov v primernem jeziku, reševanje in analiza doseženega na primerih. Ker je za razumevanje predmeta potrebno solidno obvladanje nekaterih vsebin iz analize in linearne algebre, se študent nauči uporabljati znanje, pridobljeno pri drugih predmetih. Nauči se tudi spretnosti uporabe tuje literature.

Knowledge and understanding: Understanding the relation between the algebraic equations and the geometric objects. Ability of treating some geometric problems by means of tools, coming from the theory of polynomials.

Knowledge and understanding of the fundamental concepts of the theory of algebraic curves and algebraic geometry.

Application: Algebraic description of objects, appearing in problems from other areas of mathematics and its applications. Application of algebro-geometric methods in the treatment of such problems.

Reflection: Ability of perceiving mathematical object from different points of view.

Development of the geometric approach to solving problems in applicative mathematics.

Transferable skills: Formulation of problems in suitable contexts, evaluation of developed tools in concrete examples. This course demands a firm knowledge of certain chapters from mathematical analysis and algebra. Therefore students learn how to use previously acquired knowledge in new situations. Students learn the use of study literature in foreign languages.

**Metode poučevanja in učenja:**

Predavanja, vaje, konzultacije

**Learning and teaching methods:**

Lectures, exercises, consultations

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</p> <p>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</p> <p>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:

– GRUNENFELDER, Luzius, KOŠIR, Tomaž. Koszul cohomology for finite families of comodules maps and applications. *Communications in algebra*, ISSN 0092-7872, 1997, let. 25, št. 2, str. 459-479 [COBISS.SI-ID 7127641]

– GRUNENFELDER, Luzius, KOŠIR, Tomaž. Coalgebras and spectral theory in one and several parameters. V: GOHBERG, I. (ur.), LANCASTER, P. (ur.), SHIVAKUMAR, P. N. (ur.). *Recent developments in operator theory and its applications : International Conference in Winnipeg, October 2-6, 1994*, (Operator theory, ISSN 0255-0156, vol. 87). Basel, Boston, Berlin: Birkhäuser, cop. 1996, str. 177-192 [COBISS.SI-ID 7436889]

– GRUNENFELDER, Luzius, GURALNICK, Robert M., KOŠIR, Tomaž, RADJAVI, Heydar. Permutability of characters on algebras. *Pacific journal of mathematics*, ISSN 0030-8730, 1997, let. 178, št. 1, str. 63-70 [COBISS.SI-ID 7437145]

Pavle Saksida:

– SAKSIDA, Pavle. Nahm's equations and generalizations Neumann system. *Proceedings of the London Mathematical Society*, ISSN 0024-6115, 1999, let. 78, št. 3, str. 701-720 [COBISS.SI-ID 8853849]

– SAKSIDA, Pavle. Integrable anharmonic oscillators on spheres and hyperbolic spaces. *Nonlinearity*, ISSN 0951-7715, 2001, vol. 14, no. 5, str. 977-994 [COBISS.SI-ID 10942809]

– SAKSIDA, Pavle. Neumann system, spherical pendulum and magnetic fields. *Journal of physics. A, Mathematical and general*, ISSN 0305-4470, 2002, vol. 35, no. 25, str. 5237-5253 [COBISS.SI-ID 11920217]