

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
Predmet:		Računalniško podprto (geometrijsko) oblikovanje				
Course title:		Computer aided (geometric) design				
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year	Semester Semester	
Magistrski študijski program Matematika		ni smeri		1 ali 2	prvi ali drugi	
Master's study programme Mathematics		none		1 or 2	first or second	
Vrsta predmeta / Course type				izbirni		
Univerzitetna koda predmeta / University course code:				M2409		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	15	30			105	6
Nosilec predmeta / Lecturer:		prof. Emil Žagar, prof. Gašper Jaklič				
Jeziki / Languages:		Predavanja / Lectures: slovenski/Slovene, angleški/English				
		Vaje / Tutorial: slovenski/Slovene, angleški/English				
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Vsebina:				Content (Syllabus outline):		
Uvod: de Casteljaouv algoritem, Bernsteinova oblika Bezierove krivulje, Bezierove krivulje (splošno), zlepci v Bezierovi obliki, racionalne Bezierove krivulje				Introduction: de Casteljaou algorithm, Bernstein form of Bezier curve, Bezier curves (general), Bezier splines, rational Bezier curves Geometric continuity: geometric continuity of		

Geometrijska zveznost: geometrijska zveznost krivulj in ploskev, geometrijsko zvezni zleпки	curves and surfaces, geometrically continuous splines
Bezierove ploskve: tenzorski produkti, trikotne krpe, racionalne Bezierove ploskve	Bezier surfaces: tensor products, triangular patches, rational Bezier surfaces
Stožnice: racionalne kvadratne Bezierove krivulje, eksaktna reprezentacija stožnic	Conics: rational quadratic Bezier curves, exact representation of conics
Krivulje B-zlepков: lastnosti, algoritmi za delo z B-zlepki	B-spline curves: properties, algorithms for manipulating B-spline curves

Temeljni literatura in viri / Readings:

G. Farin: Curves and Surfaces for Computer Aided Geometric Design : A Practical Guide, 4th edition, Academic Press, San Diego, 1997.

C. de Boor: A Practical Guide to Splines, Springer, New York, 2001.

R. H. Bartels, J. C. Beatty, B. A. Barsky: An Introduction to Splines for Use in Computer Graphics and Geometric Modeling: Morgan Kaufmann, Palo Alto, 1996.

M.-J. Lai, L. L. Schumaker, Spline functions on triangulations, Cambridge University Press, 2007

Cilji in kompetence:

Študent spozna osnove računalniškega oblikovanja. Uporaba Bezierovih krivulj in ploskev, racionalnih Bezierovih krivulj in geometrijsko zveznih zlepkov.

V okviru seminarских/projektnih aktivnosti študentje z individualnim delom in predstavitvijo ter delom v skupinah pridobijo izobraževalno komunikacijske in socialne kompetence za prenos znanj in za vodenje (strokovnega skupinskega dela).

Objectives and competences:

An introduction to computer aided geometric design, use of Bezier curves and surfaces, rational Bezier curves and geometrically smooth splines.

With individual presentations and team work interactions within seminar/project activities students acquire communication and social competences for successful team work and knowledge transfer.

Predvideni študijski rezultati:

Znanje in razumevanje:

Razumevanje osnovnih pojmov krivulj in ploskev. Osnovno znanje programiranja v Matlabu ali Mathematici. Sposobnost implementacije postopkov na računalniku.

Intended learning outcomes:

Knowledge and understanding:

Knowledge of basic facts on curves and surfaces. Basic programming skill in Matlab or Mathematica. Skill to implement algorithms in programming language.

<p>Uporaba:</p> <p>Uporaba postopkov interpolacije in aproksimacije s polinomi in zlepki pri računalniškem oblikovanju.</p> <p>Refleksija:</p> <p>Razumevanje teorije na podlagi uporabe.</p> <p>Prenosljive spretnosti – niso vezane le na en predmet: Spretnost uporabe teorije v praksi. Sposobnost povezovanja znanj iz numerične matematike, analize in računalništva. Kritično presojanje razlik med teorijo in prakso.</p>	<p>Application:</p> <p>Application of interpolation and approximation with polynomials and splines in CAGD.</p> <p>Reflection:</p> <p>Understanding theory based on application.</p> <p>Transferable skills:</p> <p>Skill of using theory in practical use. Skill of interconnecting knowledge from numerical mathematics, analysis and computer science. Critical judgement of differences between theory and practical applications.</p>
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Metode poučevanja in učenja:

predavanja, vaje, domače naloge, konzultacije

Learning and teaching methods:

Lectures, exercises, homeworks, consultations

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt): projekt</p> <p>ustni izpit</p> <p>Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)</p>	<p>50%</p> <p>50%</p>	<p>Type (examination, oral, coursework, project): project</p> <p>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:

Gašper Jaklič:
– JAKLIČ, Gašper, ŽAGAR, Emil. Planar cubic G [sup] 1 interpolatory splines with small strain

energy. Journal of Computational and Applied Mathematics, ISSN 0377-0427. [Print ed.], 2011, vol. 235, iss. 8, str. 2758-2765 [COBISS.SI-ID 15770969]

– JAKLIČ, Gašper, KOZAK, Jernej, KRAJNC, Marjetka, VITRIH, Vito, ŽAGAR, Emil. Hermite geometric interpolation by rational Bézier spatial curves. SIAM journal on numerical analysis, ISSN 0036-1429, 2012, vol. 50, no. 5, str. 2695-2715 [COBISS.SI-ID 16449369]

– JAKLIČ, Gašper, KOZAK, Jernej, KRAJNC, Marjetka, VITRIH, Vito, ŽAGAR, Emil. High order parametric polynomial approximation of conic sections. Constructive approximation, ISSN 0176-4276, 2013, vol. 38, iss. 1, str. 1-18 [COBISS.SI-ID 16716121]

Emil Žagar:

– JAKLIČ, Gašper, ŽAGAR, Emil. Planar cubic G [sup] 1 interpolatory splines with small strain energy. Journal of Computational and Applied Mathematics, ISSN 0377-0427. [Print ed.], 2011, vol. 235, iss. 8, str. 2758-2765 [COBISS.SI-ID 15770969]

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