UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)			
Predmet:	Izbrana poglavja iz numerične matematike		
Course title:	Topics in numerical mathematics		

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Interdisciplinarni magistrski študijski program Računalništvo in matematika	ni smeri	1 ali 2	prvi ali drugi
Interdisciplinary Master's study programme Computer Science and Mathematics	none	1 or 2	first or second

Vrsta predmeta / Course type	izbirni / elective
Univerzitetna koda predmeta / University course code:	M2829

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. dr. Gašper Jaklič, prof. dr. Marjeta Krajnc, prof. dr. Bor Plestenjak, prof. dr. Emil Žagar

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:**
Vpis v letnik študija.	Enrolment in the programme.
Vsebina:	**Content (Syllabus outline):**

Predavatelj izbere nekatere pomembne teme s področja numerične matematike, kot so na primer: Numerična aproksimacija in interpolacija. Subdivizijske sheme. Krivulje s pitagorejskim hodografom. Metoda končnih elementov. Numerične metode za linearne sisteme upravljanja. Iterativne numerične metode v linearni algebri.	The lecturer chooses some important topics from numerical mathematics, e.g.: Numerical approximation and interpolation Subdivision schemes. Pythagorean-hodograph curves. Finite elements method Numerical methods for linear control systems. Iterative numerical methods in linear algebra.

Temeljni literatura in viri / Readings:

R. L. Burden in J. D. Faires: Numerical Analysis, 8th edition, Brooks/Cole, Pacific Grove, 2005.

N. Dyn: Subdivision Schemes in Computer-Aided Geometric Design, Advances in Numerical Analysis II Wavelets, Subdivision Algorithms and Radial Basis Functions, W. Light (ed.), Clarendon Press, Oxford, 36-104 (1992).

R. T. Farouki: Pythagorean-Hodograph Curves: Algebra and Geometry Inseparable, Geometry and Computing, vol. 1, Springer, Berlin, 2008.

J.N. Reddy: An introduction to finite elements method, McGraw-Hill, 1993.

B. N. Datta: Numerical Methods for Linear Control Systems, Academic Press, San Diego, 2004.

R. Barrett, M. W. Berry, T. F. Chan, J. Demmel, J. Donato, J. Dongarra, V. Eijkhout, R. Pozo, C. Romine, H. van der Vorst: Templates for the Solution of Linear Systems : Building Blocks for Iterative Methods, SIAM, Philadelphia, 1994.

Z. Bai, J. Demmel, J. Dongarra, A. Ruhe, H. van der Vorst: Templates for the Solution of Algebraic Eigenvalue Problems : A Practical Guide, SIAM, Philadelphia, 2000.

Cilji in kompetence:	**Objectives and competences:**

Študent podrobneje spozna eno ali več pomembnejših področij numerične matematike. Pri tem spozna nekatere najnovejše rezultate z obravnavanega področja.	The student sees the details of one or more important areas of numerical mathematics, and learns about some recent results in the subjects.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Poglobljeno znanje na enem ali več področjih numerične matematike in je sposobnost reševati probleme, ki so v praksi vezani na širše znanje s tega področja. Znanje programiranja in uporabe računalniških orodij za reševanje tovrstnih problemov.Uporaba: Numerično reševanje matematičnih problemov.Refleksija: Razumevanje teorije na podlagi uporabe.Prenosljive spretnosti – niso vezane le na en predmet: Spretnost uporabe računalnika pri reševanju matematičnih problemov.	Knowledge and understanding: A deeper knowledge of one or several topics in numerical mathematics and capability of solving practical problems somehow connected with selected subjects. Knowledge of programming and usage of computer software for solving such problems. Application: Numerical computation of mathematical problems. Reflection: Understanding of the theory from the applications. Transferable skills: The ability to solve mathematical problems using a computer.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje, domače naloge, seminar, projekti in konsultacije.	Lectures, tutorials, homeworks, seminar, projects and consultation.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Sprotno preverjanje (domače naloge, kolokviji in projektno delo)	50% 50%	Type (examination, oral, coursework, project):Continuing (homework, midterm exams, project work)Final (written and oral exam) Grading: 6-10 pass, 1-5 fail (according to the rules of University of Ljubljana)

Končno preverjanje (pisni in ustni izpit) Ocene: 6-10 pozitivno, 1-5 negativno (v skladu s Statutom UL)		

Reference nosilca / Lecturer's references:

Gašper Jaklič:

JAKLIČ, Gašper, ŽAGAR, Emil. Curvature variation minimizing cubic Hermite interpolants. Applied mathematics and computation, ISSN 0096-3003. [Print ed.], 2011, vol. 218, iss. 7, str. 3918-3924. [COBISS.SI-ID 16049241]

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. On the dimension of bivariate spline space S [sub] 3 [sup] 1 ([triangle]). International journal of computer mathematics, ISSN 0020-7160, 2005, vol. 82, no. 11, str. 1355-1369. [COBISS.SI-ID 13801305]

Marjetka Krajnc:

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]

KRAJNC, Marjetka. Interpolation scheme for planar cubic G [sup] 2 spline curves. Acta applicandae mathematicae, ISSN 0167-8019, 2011, vol. 113, no. 2, str. 129-143. [COBISS.SI-ID 16215385]

KRAJNC, Marjetka. Geometric Hermite interpolation by cubic G[sup]1 splines. Nonlinear Analysis, Theory, Methods and Applications, ISSN 0362-546X. [Print ed.], 2009, vol. 70, iss. 7, str. 2614-2626. [COBISS.SI-ID 15508569]

Bor Plestenjak:

HOCHSTENBACH, Michiel E., MUHIČ, Andrej, PLESTENJAK, Bor. On linearizations of the quadratic two-parameter eigenvalue problem. Linear Algebra and its Applications, ISSN 0024-3795. [Print ed.], 2012, vol. 436, iss. 8, str. 2725-2743. [COBISS.SI-ID 16095065]

PLESTENJAK, Bor. Numerical methods for the tridiagonal hyperbolic quadratic eigenvalue problem. V: Fifth international workshop on accurate solution in eigenvalue problems : hagen, Germany from June 29 to July 1, 2004. Philadelphia: SIAM, 2006, vol. 28, no. 4, str. 1157-1172. [COBISS.SI-ID 14367833]

HOCHSTENBACH, Michiel E., KOŠIR, Tomaž, PLESTENJAK, Bor. A Jacobi-Davidson type method for

the two-parameter eigenvalue problem. SIAM journal on matrix analysis and applications, ISSN 0895-4798, 2005, vol. 26, no. 2, str. 477-497. [COBISS.SI-ID 13613401]

Emil Žagar:

JAKLIČ, Gašper, KOZAK, Jernej, VITRIH, Vito, ŽAGAR, Emil. Lagrange geometric interpolation by rational spatial cubic Bézier curves. Computer Aided Geometric Design, ISSN 0167-8396, 2012, vol. 29, iss. 3-4, str. 175-188. [COBISS.SI-ID 16207449]

KOZAK, Jernej, ŽAGAR, Emil. On geometric interpolation by polynomial curves. SIAM journal on numerical analysis, ISSN 0036-1429, 2004, vol. 42, no. 3, str. 953-967. [COBISS.SI-ID 13398617]

ŽAGAR, Emil. On G [sup] 2 continuous spline interpolation of curves in R [sup] d. BIT, ISSN 0006-3835, 2002, vol. 42, no. 3, str. 670-688. [COBISS.SI-ID 12027993]