

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)							
Predmet:		Izbrana poglavja iz diskretne matematike					
Course title:		Topics in discrete 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:					M2842		
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. Sandi Klavžar, prof. dr. Matjaž Konvalinka, prof. dr. Marko Petkovšek, prof. dr. Primož Potočnik, prof. dr. Riste Škrekovski					
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):			

<p>Predavatelj/ica izbere nekatere pomembne teme iz diskretne matematike, kot npr.:</p> <p>Delno urejene množice.</p> <p>Ramseyeva teorija.</p> <p>Matroidi.</p> <p>Diskretna geometrija.</p> <p>Načrti in konfiguracije.</p> <p>Simetrični grafi.</p> <p>Simetrije kombinatoričnih objektov.</p> <p>Simetrične funkcije.</p> <p>Kombinatorno preštevanje.</p> <p>Diskretna verjetnost.</p> <p>Metrična teorija grafov.</p> <p>Teorija dominacije.</p> <p>Problem hanojskega stolpa.</p> <p>Pri tem si prizadeva minimizirati prekrivanje z drugimi predmeti tega študijskega programa.</p>	<p>The lecturer selects some important topics in discrete mathematics, such as:</p> <p>Partially ordered sets.</p> <p>Ramsey theory.</p> <p>Matroids.</p> <p>Discrete geometry.</p> <p>Designs and configurations.</p> <p>Symmetric graphs.</p> <p>Symmetries of combinatorial objects.</p> <p>Symmetric functions.</p> <p>Combinatorial enumeration.</p> <p>Discrete probability.</p> <p>Metric graph theory.</p> <p>Domination theory.</p> <p>The Tower of Hanoi problem.</p> <p>Special care should be taken to minimize overlap with other courses in this program.</p>
---	---

Temeljni literatura in viri / Readings:

<p>Jack H. van Lint, Robin J. Wilson: A Course in Combinatorics, Cambridge University Press, Cambridge, 2001.</p> <p>R. L. Graham, M. Grötschel and L. Lovász, editors: Handbook of Combinatorics, Elsevier Science B.V., Amsterdam, MIT Press, Cambridge, MA, 1995</p> <p>Predavatelj poleg tega lahko izbere tudi primerne novejši raziskovalne članke iz znanstvenih revij.</p>
--

Cilji in kompetence:

Objectives and competences:

Študent spozna nekatera pomembna področja diskretne matematike, kot so delno urejene množice, diskretna geometrija, diskretna verjetnost, razčlenitve in simetrične funkcije.

Students encounter some of the important areas of discrete mathematics, such as partially ordered sets, discrete geometry, discrete probability, partitions, and symmetric functions.

Predvideni študijski rezultati:

Znanje in razumevanje: Študentje se seznanijo s tematiko, metodami in glavnimi rezultati različnih področij diskretne matematike.

Uporaba: Študent bo znal pridobljeno znanje uporabiti v različnih matematičnih in drugih kontekstih.

Refleksija: Študentje spoznajo in razumejo medsebojno prepletanje in oplajanje različnih področij diskretne matematike.

Prenosljive spretnosti – niso vezane le na en predmet: Študentje spoznajo nekatere metode, uporabne pri konstrukciji in analizi diskretnih matematičnih modelov .

Intended learning outcomes:

Knowledge and understanding: Students get acquainted with the subject matter, the methods, and the main results of various areas of discrete mathematics.

Application: Students will be able to use their knowledge in different mathematical and other contexts.

Reflection: Students comprehend the interplay and mutual enrichment of various areas of discrete mathematics.

Transferable skills: Students learn methods which are useful in construction and analysis of discrete mathematical models.

Metode poučevanja in učenja:

Frontalna predavanja, projektno delo, reševanje nalog.

Learning and teaching methods:

Lecturing, projects and problem solving.

Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):	50%	Type (examination, oral, coursework, project):
Sprotno preverjanje (domače naloge, kolokviji in projektno delo)	50%	Continuing (homework, midterm exams,

Končno preverjanje (pisni in ustni izpit)		project work)
Ocene: 6-10 pozitivno, 1-5 negativno		Final (written and oral exam)
(v skladu s Statutom UL)		Grading: 6-10 pass, 1-5 fail (according to the rules of University of Ljubljana)

Reference nosilca / Lecturer's references:

Sandi Klavžar:

KLAVŽAR, Sandi. Structure of Fibonacci cubes: a survey. Journal of combinatorial optimization, ISSN 1382-6905, 2013, vol. 25, iss. 4, str. 505-522. [COBISS.SI-ID 16603737]

KLAVŽAR, Sandi, SHPECTOROV, Sergey. Convex excess in partial cubes. Journal of graph theory, ISSN 0364-9024, 2012, vol. 69, no. 4, str. 356-369. [COBISS.SI-ID 16243033]

HAMMACK, Richard H., IMRICH, Wilfried, KLAVŽAR, Sandi. Handbook of product graphs, (Discrete mathematics and its applications). Boca Raton, London, New York: CRC Press, cop. 2011. XVIII, 518 str., ilustr. ISBN 978-1-4398-1304-1. [COBISS.SI-ID 15916121]

Matjaž Konvalinka:

KONVALINKA, Matjaž, PAK, Igor. Non-commutative extensions of the MacMahon Master Theorem. Advances in mathematics, ISSN 0001-8708, 2007, vol. 216, no. 1, str. 29-61. [COBISS.SI-ID 15545689]

KONVALINKA, Matjaž. Divisibility of generalized Catalan numbers. Journal of combinatorial theory. Series A, ISSN 0097-3165, 2007, vol. 114, iss. 6, str. 1089-1100. [COBISS.SI-ID 14354265]

KONVALINKA, Matjaž, PAK, Igor. Triangulations of Cayley and Tutte polytopes. Advances in mathematics, ISSN 0001-8708, 2013, vol. 245, str. 1-33. [COBISS.SI-ID 16706905]

Marko Petkovšek:

PETKOVŠEK, Marko. Counting Young tableaux when rows are cosets. Ars combinatoria, ISSN 0381-7032, 1994, let. 37, str. 87-95. [COBISS.SI-ID 8048473]

PETKOVŠEK, Marko, WILF, Herbert S., ZEILBERGER, Doron. A=B. Wellesley (Massachusetts): A. K. Peters, cop. 1996. VII, 212 str. ISBN 1-56881-063-6. [COBISS.SI-ID 4085337]

PETKOVŠEK, Marko. Letter graphs and well-quasi-order by induced subgraphs. Discrete Mathematics, ISSN 0012-365X. [Print ed.], 2002, vol. 244, no. 1-3, str. 375-388. [COBISS.SI-ID 11414873]

Primož Potočnik:

POTOČNIK, Primož. Tetravalent arc-transitive locally-Klein graphs with long consistent cycles. European journal of combinatorics, ISSN 0195-6698, 2014, vol. 36, str. 270-281. [COBISS.SI-ID 16862041]

POTOČNIK, Primož, SPIGA, Pablo, VERRET, Gabriel. Cubic vertex-transitive graphs on up to 1280 vertices. Journal of symbolic computation, ISSN 0747-7171, 2013, vol. 50, str. 465-477. [COBISS.SI-ID 16520537]

POTOČNIK, Primož. Edge-colourings of cubic graphs admitting a solvable vertex-transitive group of automorphisms. Journal of combinatorial theory. Series B, ISSN 0095-8956, 2004, vol. 91, no. 2, str. 289-300. [COBISS.SI-ID 13087321]

Riste Škrekovski:

GOVORČIN, Jelena, KNOR, Martin, ŠKREKOVSKI, Riste. Line graph operation and small worlds. Information processing letters, ISSN 0020-0190. [Print ed.], 2013, vol. 113, iss. 5-6, str. 196-200. [COBISS.SI-ID 16561497]

DVOŘÁK, Zdeněk, LIDICKÝ, Bernard, ŠKREKOVSKI, Riste. Randić index and the diameter of a graph. European journal of combinatorics, ISSN 0195-6698, 2011, vol. 32, iss. 3, str. 434-442. [COBISS.SI-ID 17410905]

KAISER, Tomáš, STEHLÍK, Matěj, ŠKREKOVSKI, Riste. On the 2-resonance of fullerenes. SIAM journal on discrete mathematics, ISSN 0895-4801, 2011, vol. 25, no. 4, str. 1737-1745. [COBISS.SI-ID 16244569]