UČNI NAČRT PREDMETA / COURSE SYLLABUS			
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 Masters study programme Computer Science and Mathematics	none	1 or 2	first or second

Vrsta predmeta / Course type	izbirni
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:	Matjaž Konvalinka, prof. Marko Petkovšek, prof. Primož Potočnik, prof. Riste Škrekovski, prof. Sandi Klavžar

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):**

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

Temeljni literatura in viri / Readings:

Jack H. van Lint, Robin J. Wilson: A Course in Combinatorics, Cambridge University Press, Cambridge, 2001.

R. L. Graham, M. Grötschel and L. Lovász, editors: Handbook of Combinatorics, Elsevier Science B.V., Amsterdam, MIT Press, Cambridge, MA, 1995

Predavatelj poleg tega lahko izbere tudi primerne novejše raziskovalne članke iz znanstvenih revij.

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:	**Intended learning outcomes:**
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 .	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:	**Learning and teaching methods:**
Frontalna predavanja, projektno delo, reševanje nalog.	Lecturing, projects and problem solving.

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)

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

Reference nosilca / Lecturer's references:

Sandi Klavžar:

– 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]

– 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]

– 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]

Matjaž Konvalinka:

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

– 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. 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]

– 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. 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]

Riste Škrekovski:

– 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]

– 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]