

UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)							
Predmet:		Teorija grafov					
Course title:		Graph Theory					
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 temeljni / core elective		
Univerzitetna koda predmeta / University course code:					M2213		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS	
45		30			105	6	
Nosilec predmeta / Lecturer:		prof. dr. Sandi Klavžar, prof. dr. Primož Potočnik, prof. dr. Riste Škrekovski, prof. dr. Arjana Žitnik					
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>Povezanost, struktura 3-povezanih grafov. Ravninski grafi, dokaz izreka Kuratowskega, Schnyderjev izrek.</p> <p>Spektralna teorija grafov.</p> <p>Barvanja in pretoki.</p> <p>Prirejanja in pokritja v grafih, Tuttov izrek.</p> <p>Metrična teorija grafov, vložitve metričnih prostorov v grafe.</p> <p>Operacije nad grafi, grafovski produkti.</p>	<p>Connectivity, structure of 3-connected graphs. Planar graphs, proof of Kuratowski theorem, Schnyder theorem. Spectral graph theory. Colorings and flows. Matchings and coverings, Tutte theorem. Metric graph theory, embeddings of metric spaces into graphs. Operations on graphs, graph products.</p>
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Temeljni literatura in viri / Readings:

- A. Bondy, U.S.R. Murty: Graph Theory, 2. izdaja, Springer, Berlin, 2008.
- R. Diestel: Graph Theory, 3rd Edition, Springer, Berlin, 2005.- W. Imrich, S. Klavžar, D.F. Rall, Topics in Graph Theory, A K Peters, Wellesley, 2008.- M. Juvan, P. Potočnik: Teorija grafov in kombinatorika: primeri in rešene naloge, Društvo matematikov, fizikov in astronomov Slovenije, Ljubljana 2000, 173 str. - D.B. West, Introduction to Graph Theory, 2nd Edition, Prentice Hall, Upper Sadle River, 2001.

Cilji in kompetence:

Študent poglobi in razširi znanje teorije grafov. Spozna uporabnost grafov in omrežij na različnih področjih matematike (kombinatorika, linearna algebra, teorija grup, delno urejene množice ...) ter možnosti za njihovo uporabo tudi v drugih vejah znanosti.

Objectives and competences:

Students deepen and expand the knowledge of graph theory. They learn applicability of graphs and networks in different fields of mathematics (combinatorics, linear algebra, group theory, partially ordered sets...) and possibilities for their applications in other fields of science.

Predvideni študijski rezultati:

Znanje in razumevanje:
Študent natančneje spozna izbrana področja teorije grafov. Seznanani se z najnovejšimi rezultati tega področja in z njegovimi uporabami v matematiki in drugih področjih znanosti.

Intended learning outcomes:

Knowledge and understanding:
Students get acquainted in detail with the selected topics from graph theory. They learn about the latest results in the field and its applications in mathematics and other fields of science.

Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja, vaje, domače naloge, konzultacije, projekti.	Lectures, exercises, homework, consultations, projects.
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		Delež (v %) / Weight (in %)	Assessment:
Načini ocenjevanja:			
Način (pisni izpit, ustno izpraševanje, naloge, projekt):			Type (examination, oral, coursework, project):Continuing (homework, midterm exams, project work)Final (written and oral exam)
Sprotno preverjanje (domače naloge, kolokviji in projektno delo)			Grading: 6-10 pass, 1-5 fail (according to the rules of University of Ljubljana)
Končno preverjanje (pisni in ustni izpit)	50%		
Ocene: 6-10 pozitivno, 1-5 negativno (v skladu s Statutom UL)	50%		

Reference nosilca / Lecturer's references:

<p>Primož Potočnik:</p> <p>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]</p> <p>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]</p> <p>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]</p> <p>Sandi Klavžar:</p> <p>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]</p> <p>BREŠAR, Boštjan, KLAVŽAR, Sandi, RALL, Douglas. Domination game and an imagination strategy. SIAM journal on discrete mathematics, ISSN 0895-4801, 2010, vol. 24, no. 3, str. 979-991. [COBISS.SI-ID 15648089]</p>

KLAVŽAR, Sandi. On the canonical metric representation, average distance, and partial Hamming graphs. *European journal of combinatorics*, ISSN 0195-6698, 2006, vol. 27, no. 1, str. 68-73. [COBISS.SI-ID 13858905]

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]

Arjana Žitnik:

MILANIČ, Martin, PISANSKI, Tomaž, ŽITNIK, Arjana. Dilation coefficient, plane-width, and resolution coefficient of graphs. *Monatshefte für Mathematik*, ISSN 0026-9255, 2013, vol. 170, no. 2, str. 179-193. [COBISS.SI-ID 1024499540]

ŽITNIK, Arjana, HORVAT, Boris, PISANSKI, Tomaž. All generalized Petersen graphs are unit-distance graphs. *Journal of the Korean Mathematical Society*, ISSN 0304-9914, 2012, vol. 49, no. 3, str. 475-491. [COBISS.SI-ID 16217945]

JURIŠIĆ, Aleksandar, TERWILLIGER, Paul, ŽITNIK, Arjana. The Q-polynomial idempotents of a distance-regular graph. *Journal of combinatorial theory. Series B*, ISSN 0095-8956, 2010, vol. 100, iss. 6, str. 683-690. [COBISS.SI-ID 15688537]