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

Vrsta predmeta / Course type	temeljni
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. Arjana Žitnik, 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):**

Povezanost, struktura 3-povezanih grafov. Ravninski grafi, dokaz izreka Kuratowskega, Schnyderjev izrek. Spektralna teorija grafov. Barvanja in pretoki. Prirejanja in pokritja v grafih, Tuttov izrek. Metrična teorija grafov, vložitve metričnih prostorov v grafe. Operacije nad grafi, grafovski produkti.	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.

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:	**Objectives and competences:**
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.	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:	**Intended learning outcomes:**
Znanje in razumevanje: Študent natančneje spozna izbrana področja teorije grafov. Seznani se z najnovejšimi rezultati tega področja in z njegovimi uporabami v matematiki in drugih področjih znanosti.	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.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Sprotno preverjanje (domače naloge, kolokviji in projektno delo) Končno preverjanje (pisni in ustni izpit) Ocene: 6-10 pozitivno, 1-5 negativno (v skladu s Statutom UL)	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)

Reference nosilca / Lecturer's references:

Sandi Klavžar:

– 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]

– 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]

– 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]

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]

Arjana Žitnik:

– 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]

– 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]

– 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]