UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)			
Predmet:	Verjetnostne metode v računalništvu		
Course title:	Probabilistic methods in computer science		

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:	M2822

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. Sergio Cabello Justo

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):**

Quicksort in minimalni prerez. Razredi problemov in vrste naključnostnih algoritmov. Uporaba polinomov. Černove meje. Naključnostni prirastni algoritmi in povratna analiza. Linearno programiranje v nižjih dimenzijah. Markovske verige. Približno štetje. Podlinearni algoritmi. Verjetnostna metoda.	Quicksort and minimum cut. Classes of problems and types of randomized algorithms. Use of polynomials. Chernoff bounds. Randomized incremental constructions and backwards analysis. Linear programming in low dimensions. Markov chains. Approximate counting. Sublinear algorithms. Probabilistic method.

Temeljni literatura in viri / Readings:

M. Mitzenmacher in E. Upfal. Probability and Computing. Cambridge University Press, 2005.

R. Motwani, P. Raghavan. Randomized Algorithms. Cambridge University Press, Cambridge, 1995.

M. de Berg, O. Cheong, M. van Kreveld, M. Overmars. Computational Geometry: Algorithms and Applications. 3. izdaja, Springer, 2008.

J. Kleinberg in É. Tardos. Algorithm Design. Addison-Wesley, 2005.

Cilji in kompetence:	**Objectives and competences:**
Študent spozna uporabo verjetnosti za algoritmične in sorodne probleme.	Student gets acquainted with the use of probability for algoritmic and related problems.

Predvideni študijski rezultati:	**Intended learning outcomes:**

Osnovni naključnostni algoritmi. Naključnostni algoritmi v računski geometriji. Uporaba verjetnosti za analiziranje časovne zahtevnosti algoritmov. Uporaba verjetnosti za dokazovanje obstoja objektov.	Basic randomized algorithms. Randomized algorithms in computational geometry. Using probability to analize the running time of algorithms. Use of probability to show existance of objects.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminar, vaje, domače naloge, konzultacije, in samostojno delo študentov.	Lectures, seminar, exercises, homework, consultations, and independent work by the students.

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 ali 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 or oral exam) Grading: 6-10 pass, 1-5 fail (according to the rules of University of Ljubljana)

Reference nosilca / Lecturer's references:

CABELLO, Sergio, ROTE, Günter. Obnoxious centers in graphs. SIAM journal on discrete mathematics, ISSN 0895-4801, 2010, vol. 24, no. 4, str. 1713-1730. [COBISS.SI-ID 15762265]

BERG, Mark de, CABELLO, Sergio, HAR-PELED, Sariel. Covering many or few points with unit disks. Theory of computing systems, ISSN 1432-4350, 2009, vol. 45, no. 3, str. 446-469. [COBISS.SI-ID 14900825]

CABELLO, Sergio, FORT, Marta, SELLARÈS, J. Antoni. Higher-order Voronoi diagrams on triangulated surfaces. Information processing letters, ISSN 0020-0190. [Print ed.], 2009, vol. 109, iss. 9, str. 440-

445. [COBISS.SI-ID 15160153]