

UČNI NAČRT PREDMETA / COURSE SYLLABUS							
<b>Predmet:</b>		Verjetnostne metode v računalništvu					
<b>Course title:</b>		Probabilistic methods in computer science					
<b>Študijski program in stopnja</b> Study programme and level		<b>Študijska smer</b> Study field		<b>Letnik</b> Academic year		<b>Semester</b> 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	
<b>Vrsta predmeta / Course type</b>				izbirni			
<b>Univerzitetna koda predmeta / University course code:</b>				M2840			
<b>Predavanja</b> Lectures	<b>Seminar</b> Seminar	<b>Vaje</b> Tutorial	<b>Klinične vaje</b> work	<b>Druge oblike študija</b>	<b>Samost. delo</b> Individ. work	<b>ECTS</b>	
30	15	30			105	6	
<b>Nosilec predmeta / Lecturer:</b>				prof. Sergio Cabello Justo			
<b>Jeziki / Languages:</b>		<b>Predavanja / Lectures:</b>		slovenski/Slovene, angleški/English			
		<b>Vaje / Tutorial:</b>		slovenski/Slovene, angleški/English			
<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>				<b>Prerequisites:</b>			
<b>Vsebina:</b>				<b>Content (Syllabus outline):</b>			
Quicksort in minimalni prerez.				Quicksort and minimum cut. Classes of problems and types of randomized			

<p>Razredi problemov in vrste naključnostnih algoritmov.</p> <p>Uporaba polinomov.</p> <p>Černove meje.</p> <p>Naključnostni prirastni algoritmi in povratna analiza.</p> <p>Linearno programiranje v nižjih dimenzijah.</p> <p>Markovske verige.</p> <p>Približno štetje.</p> <p>Podlinearni algoritmi.</p> <p>Verjetnostna metoda.</p>	<p>algorithms.</p> <p>Use of polynomials.</p> <p>Chernoff bounds.</p> <p>Randomized incremental constructions and backwards analysis.</p> <p>Linear programming in low dimensions.</p> <p>Markov chains.</p> <p>Approximate counting.</p> <p>Sublinear algorithms.</p> <p>Probabilistic method.</p>
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#### 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:

Študent spozna uporabo verjetnosti za algoritmične in sorodne probleme.

#### Objectives and competences:

Student gets acquainted with the use of probability for algorithmic and related problems.

#### Predvideni študijski rezultati:

Osnovni naključnostni algoritmi.

Naključnostni algoritmi v računski geometriji.

Uporaba verjetnosti za analiziranje časovne zahtevnosti algoritmov.

#### Intended learning outcomes:

Basic randomized algorithms.

Randomized algorithms in computational geometry.

Using probability to analyze the running time of

Uporaba verjetnosti za dokazovanje obstoja objektov.

algorithms.  
Use of probability to show existence of objects.

**Metode poučevanja in učenja:**

Predavanja, seminar, vaje, domače naloge, konzultacije, in samostojno delo študentov.

**Learning and teaching methods:**

Lectures, seminar, exercises, homework, consultations, and independent work by the students.

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

**Assessment:**

Izpit iz vaj (2 kolokvija ali pisni izpit) ali domače naloge ustni izpit		Exercise-based exam (2 midterm exams or written exam) or homework Oral exam
Ocene: 6-10 pozitivno, 5 negativno (v skladu s Statutom UL)	50% 50%	Grading: 6-10 pass, 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]