

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>		

<p>Quicksort in minimalni prerez.</p> <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>Quicksort and minimum cut.</p> <p>Classes of problems and types of randomized 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:**

**Objectives and competences:**

Študent spozna uporabo verjetnosti za algoritmične in sorodne probleme.

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.

Uporaba verjetnosti za dokazovanje obstoja objektov.

**Intended learning outcomes:**

Basic randomized algorithms.

Randomized algorithms in computational geometry.

Using probability to analyze the running time of 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.

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %)

**Assessment:**

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt):	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)
Sprotno preverjanje (domače naloge, kolokviji in projektno delo)	50%	
Končno preverjanje (pisni ali ustni izpit)		

Ocene: 6-10 pozitivno, 1-5 negativno  (v skladu s Statutom UL)		
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**Reference nosilca / Lecturer's references:**

Sergio Cabello Justo:

- 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]
- 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]