

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
<b>Predmet:</b>		Računska geometrija				
<b>Course title:</b>		Computational geometry				
<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>				M2802		
<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>Presečišča daljic. Algoritmi pometanja.</p> <p>Večkotniki in triangulacije večkotnikov.</p> <p>Konveksne množice. Algoritme za iskanje konveksne ovojnice točk v ravnini.</p> <p>DCEL. Problem določanja položaja.</p> <p>Voronoevi diagrami. Fortuneov algoritem.</p> <p>Delaunayeva triangulacija.</p> <p>Podatkovne strukture za točke.</p> <p>Dualnost in razporeditve.</p>	<p>Segment intersections. Sweep-line algorithms.</p> <p>Polygons and triangulations of polygons.</p> <p>Convex sets. Algorithms to construct the convex hull of points in the plane.</p> <p>DCEL. Point location problem.</p> <p>Voronoi digrams. Fortune's algorithm.</p> <p>Delaunay triangulation.</p> <p>Data structures for points.</p> <p>Duality and arrangements.</p>
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#### Temeljni literatura in viri / Readings:

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

S. Devadoss, J. O'Rourke, Discrete and Computational Geometry, Princeton University Press, 2011.

J. O'Rourke, Computational Geometry in C, 2. izdaja, Cambridge University Press, 1998.

#### Cilji in kompetence:

Študent nadgradi svoje poznavanje podatkovnih struktur in osnovnih algoritmov, ki se uporabljajo za algoritmično reševanje geometrijskih in sorodnih problemov.

#### Objectives and competences:

Students build their knowledge of data structures and basic algorithms used for solving geometric and related problems.

#### Predvideni študijski rezultati:

Osnovni geometrijski objekti  
Računanje z geometrijskimi podatki

Osnovne podatkovne strukture za geometrijske podatke

Osnovni algoritmi računske geometrije

#### Intended learning outcomes:

Basic geometric objects  
Computing with geometric data

Basic data structures for geometric data

Basic algorithms in Computational Geometry.

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**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:**

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)

Delež (v %) /  
Weight (in %)

**Assessment:**

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)

50%

50%

**Reference nosilca / Lecturer's references:**

Sergio Cabello Justo:

- CABELLO, Sergio, GIANNOPOULOS, Panos, KNAUER, Christian, ROTE, Günter. Matching point sets with respect to the Earth Mover's Distance. Computational geometry, ISSN 0925-7721. [Print ed.], 2008, vol. 39, iss. 2, str. 118-133 [COBISS.SI-ID 14450521]
- BERG, Mark de, CABELLO, Sergio, HAR-PELED, Sarel. 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, KNAUER, Christian. Algorithms for graphs of bounded treewidth via orthogonal range searching. Computational geometry, ISSN 0925-7721. [Print ed.], 2009, vol. 42, iss. 9, str. 815-824 [COBISS.SI-ID 15160409]