UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Fraktali
Course title:	Fractals

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj	/	3. ali / or 4.	6. ali / or 8.
Five-year master's degree program Subject Teacher	/		

Vrsta predmeta / Course type Izbirni / Elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	-	15	-	-	45	3

Nosilec predmeta / Lecturer: Mateja Grašič

Jeziki / Languages:	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
/	/

Vsebina:

Content (Syllabus outline):

• Metrični prostor, različne vrste podprostorov, prostor fraktalov. • Afine transformacije, skrčitve, sistemi iterirajočih funkcij. • Teoretično in eksperimentalno določanje dimenzije fraktala, Hausdorff-Bezikovičeva dimenzija.	• A metric space, different types of subspaces, the space of fractals. • Affine transformations, contraction mappings, systems of iterating functions. • The theoretical and experimental determination of the fractal dimension, Hausdorff-Besicovitch dimension.

Temeljni literatura in viri / Readings:

K. J. Falconer: Fractal Geometry. J. Wiley, Chichester (1990)

Y. Pesin, V. Climenhaga: Elements of Fractal Geometry and Dynamics, spletni vir: https://www.math.uh.edu/~climenha/doc/fractals.pdf)

Y. Pesin, V. Climenhaga: Lectures on Fractal Geometry and Dynamical Systems, American Mathematical Society (2009)

J. Vrabec: Metricni prostori. Ljubljana: DMFA (1993).

H. Zeitler, D. Pagon: Fraktale Geometrie: eine Einführung, Vieweg, Braunschweig (2000)

Cilji in kompetence:	**Objectives and competences:**
Študenti se seznanijo s strukturo podprostora fraktalov v metričnem prostoru in z osnovnimi načini generiranja fraktalov (družine iterirajočih preslikav). Spoznajo tudi nekaj glavnih definicij dimenzije fraktala.	Students get familiar with the structure of the subset of fractals in a metric space and with the main ways of generating fractals (iterated functions systems). They also learn the main definitions of the dimension of a fractal set.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • aktivno obvladanje strukture metričnega prostora in prepoznavanje fraktalnih podmnožic • sposobnost generiranja fraktalov • teoretično in eksperimentalno določanje dimenzije fraktalov	Knowledge and understanding: • active knowledge of metric space structure and the ability to recognize its fractal subsets • the abbility to generate fractals • theoretical and experimental ways to find the dimension of a fractal

Metode poučevanja in učenja:	**Learning and teaching methods:**

	Delež (v %) /	
• Predavanja • Seminarske vaje • Individualno delo		• Lectures • Excersises • Individual work

Načini ocenjevanja:	Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt): • pisni izpit – praktični del • ustni izpit – teoretični del Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Pozitivna ocena pri pisnem testu je pogoj za pristop k ustnem izpitu.	 50% 50%	Type (examination, oral, coursework, project): • written exam – practical part • oral exam **–** theoretical part Each of the mentioned commitments must be assessed with a passing grade. Passing grade of the written test is required for taking the oral exam.

Reference nosilca / Lecturer's references:

1. XIA, Yong-Hui, GRAŠIČ, Mateja, HUANG, Wentao, ROMANOVSKI, Valery. Limit cycles in a model of olfactory sensory neurons. *International journal of bifurcation and chaos in applied sciences and engineering*. 2019, vol. 29, no. 3, str. 1950038-1-1950038-9. ISSN 0218-1274. DOI: 10.1142/S021812741950038X. [COBISS.SI-ID 22250006]

2. BENKOVIČ, Dominik, GRAŠIČ, Mateja. Generalized skew derivations on triangular algebras determined by action on zero products. *Communications in algebra*. 2018, vol. 46, iss. 5, str. 1859-1867. ISSN 0092-7872. https://doi.org/10.1080/00927872.2017.1360334, DOI: 10.1080/00927872.2017.1360334. [COBISS.SI-ID 18505817]

3. GRAŠIČ, Mateja. Zero product determined Jordan algebras, II. *Algebra colloquium*. 2015, vol. 22, iss. 1, str. 109-118. ISSN 1005-3867. DOI: 10.1142/S1005386715000103. [COBISS.SI-ID 21136136]

4. BENKOVIČ, Dominik, GRAŠIČ, Mateja. Generalized derivations on unital algebras determined by action on zero products. *Linear Algebra and its Applications*. [Print ed.]. 2014, vol. 445, str. 347-368. ISSN 0024-3795. http://dx.doi.org/10.1016/j.laa.2013.12.010. [COBISS.SI-ID 20314120]

5. BIERWIRTH, Hannes, BREŠAR, Matej, GRAŠIČ, Mateja. On maps determined by zero products. *Communications in algebra*. 2012, vol. 40, no. 6, str. 2081-2090. ISSN 0092-7872. http://dx.doi.org/10.1080/00927872.2011.570833. [COBISS.SI-ID 16315481]