



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

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	6. ali / or
Five-year master's degree program Subject Teacher	/	4.	8.

Vrsta predmeta / Course type

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:

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Vsebina:

Prerequisites:

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:

Barnsley, M. F.: Fractals Everywhere. Academic Press, Boston (1993)

Barnsley, M. F.: Superfractals. Cambridge University Press, Cambridge (2008)

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

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

Cilji in kompetence:

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.

Objectives and competences:

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:

Znanje in razumevanje:

- aktivno obvladanje strukture metričnega prostora in prepoznavanje fraktalnih podmnožic
- sposobnost generiranja fraktalov
- teoretično in eksperimentalno določanje dimenzije fraktalov

Intended learning outcomes:

Knowledge and understanding:

- active knowledge of metric space structure and the ability to recognize its fractal subsets
- the ability to generate fractals
- theoretical and experimental ways to find the dimension of a fractal

Metode poučevanja in učenja:

- Predavanja
- Seminarske vaje
- Individualno delo

Learning and teaching methods:

- Lectures
- Excercises
- Individual work

Delež (v %) /

Načini ocenjevanja:**Weight (in %)****Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
<ul style="list-style-type: none"> • seminarska naloga • pisni izpit – praktični del • ustni izpit – teoretični del 	20% 40% 40%	<ul style="list-style-type: none"> • coursework • written exam – practical part • oral exam – theoretical part
Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.		Each of the mentioned commitments must be assessed with a passing grade.
Pozitivna ocena pri pisnem testu je pogoj za pristop k izpitu.		Passing grade of the written test is required for taking the exam.

Reference nosilca / Lecturer's references:

1. ZEITLER, Herbert, PAGON, Dušan. *Fraktale Geometrie : eine Einführung : für Studienanfänger, Studierende des Lehramtes, Lehrer und Schüler*. Braunschweig; Wiesbaden: Vieweg, cop. 2000. 200 str., ilustr., ISBN 3-528-03152-2. [COBISS.SI-ID [10140168](#)]
2. PAGON, Dušan. Self-similar planar fractals based on branching trees and bushes. *Prog. theor. phys., Suppl.*, 2003, no. 150, str. 176-187, ilustr. [COBISS.SI-ID [13012232](#)]
3. KOSI-ULBL, Irena, PAGON, Dušan. The n-simplex and its generalizations towards fractals. *Int. J. Math. Educ. Sci. Technol.*, 2002, vol. 33, no. 3, str. 393-404, ilustr. [COBISS.SI-ID [11923976](#)]
4. PAGON, Dušan. The dynamics of selfsimilar sets generated by multibranching trees. *International journal of computational and numerical analysis and applications*, 2004, vol. 6, no. 1, str. 65-76. [COBISS.SI-ID [14037081](#)]
5. PAGON, Dušan. The dynamics of selfsimilar sets of points generated by multibranching trees. V: BAINOV, Drumi (ur.), NENOV, Svetoslav (ur.). *Second International Conference of Applied Mathematics : SICAM, August 12-18 2005, Plovdiv Bulgaria*. Plovdiv: [s. n.], 2005, str. 196. [COBISS.SI-ID [14212360](#)]