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**
Izobraževalna matematika, dvopredmetni študij, 2. stopnja	Modul D2	**1. ali 2.**	**2. ali 4.**
Educational mathematics, double major 2nd degree	Module D2	**1. or 2.**	**2. or 4.**

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:	Dušan PAGON

Jeziki / Languages:	**Predavanja / Lectures:**	SLOVENSKO/SLOVENE
	Vaje / Tutorial:	SLOVENSKO/SLOVENE

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Jih ni.	There are none.
Vsebina:	**Content (Syllabus outline):**
• Metričen 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 (1988); Second edition (1993)
Barnsley, M. F.: Superfractals. Cambridge University Press, Cambridge (2006)
Devaney. R. L.: Chaos, Fractals and Dynamics - Computer Experiments in Dynamics, Addison-Wesley (1990)
Edgar, G: Classics on Fractals. Westview Press, Boulder (1992)
Falconer, K. J.: The Geometry of Fractal Sets. Cambridge University Press,

Cambridge (1985)

Cilji in kompetence:

Študenti se seznanijo s strukturo podprostora fraktalov v metričnem prostoru in z osnovnimi načini generiranja fraktalov (družine iterirajočih preslikav). Spoznajo tudi definicijo 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 definition of the fractal dimension.

Predvideni študijski rezultati:

Znanje in razumevanje:

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

Prenesljive/ključne spretnosti in drugi atributi:

- sposobnost generiranja fraktalov
- izračun dimenzije fraktalne množice

Intended learning outcomes:

Knowledge and Understanding:

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

Transferable/Key Skills and other attributes:

- the abbility to generate fractals
- the calculation of fractal dimension

Metode poučevanja in učenja:

- Predavanja
- Seminarske vaje
- Individualno delo

Learning and teaching methods:

- Lectures
- Tutorial
- Individual work

Načini ocenjevanja:

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)	Delež (v %) / Weight (in %)	Type (examination, oral, coursework, project):
• seminarska naloga	20%	• coursework
• pisni izpit – praktični del	40%	• written exam – practical part
• ustni izpit – teoretični del	40%	• oral exam – theoretical part

Reference nosilca / Lecturer's references:

1. PAGON, Dušan, REPOVŠ, Dušan, ZAICEV, Mikhail. On the codimension growth of simple color Lie superalgebras. *J. Lie theory*, 2012, vol. 22, no. 2, str. 465-479. http://www.heldermann.de/JLT/JLT22/JLT222/jlt22017.htm. [COBISS.SI-ID 16070233]

2. PAGON, Dušan. Simplified square equation in the quaternion algebra. *International journal of pure and applied mathematics*, 2010, vol. 61, no. 2, str. 231-240. [COBISS.SI-ID 17718024]

3. GUTIK, Oleg, PAGON, Dušan, REPOVŠ, Dušan. On chains in H-closed topological pospaces. *Order (Dordr.)*, 2010, vol. 27, no. 1, str. 69-81. http://dx.doi.org/10.1007/s11083-010-9140-x. [COBISS.SI-ID 15502169]

4. GUTIK, Oleg, PAGON, Dušan, REPOVŠ, Dušan. The continuity of the inversion and the structure of maximal subgroups in countably compact topological semigroups. *Acta math. Hung.*, 2009, vol. 124, no. 3, str. 201-214. http://dx.doi.org/10.1007/s10474-009-8144-8, doi: 10.1007/s10474-009-8144-8. [COBISS.SI-ID 15212121]

5. 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]