UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Funkcionalna analiza
Course title:	Functional analysis

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika, 2. stopnja		1. ali 2.	2. ali 4.
Mathematics, 2nd degree		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
60		45			195	10

Nosilec predmeta / Lecturer: Daniel EREMITA

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

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

Prerequisits:

Poznavanje linearne algebre in analize.	Knowledge of linear algebra and analysis.

Vsebina:

Content (Syllabus outline):

Banachovi prostori: vektorski in normirani prostori, polnost, primeri; podprostori in kvocientni prostori; končno-razsežni normirani prostori, kompaktne množice; Banachove algebre, spekter.	Banach spaces: vector spaces and normed spaces, completness, examples; subspaces and quotient spaces; finite dimensional normed spaces, compact sets; Banach algebras, spectrum.
Linearni operatorji in funkcionali: omejeni in neomejeni linearni operatorji; kompaktni operatorji; izreki o enakomerni omejenosti, odprti preslikavi in zaprtem grafu; dual, Hahn-Banachov izrek, refleksivni prostori.	Linear operators and functionals: bounded and unbounded linear operators; compact operators; uniform boundedness principle, open mapping theorem, closed graph theorem; dual, Hahn-Banach theorem, reflexive spaces.

Hilbertovi prostori: osnovni pojmi in primeri; ortogonalnost, Rieszov izrek; ortonormirane množice; adjungirani operatorji.	Hilbert spaces: basic concepts and examples; orthogonality, Riesz theorem; orthonormal bases, adjoint operators.

Temeljni literatura in viri / Readings:

B. Brown, A. Page, Elements of functional analysis, Van Nostrand, 1970.

M. Hladnik, Naloge in primeri iz funkcionalne analize in teorije mere, DMFA, 1985.

B. P. Rynne, M. A. Youngson, Linear functional analysis, Springer, 2000.

J. Vrabec, Metrični prostori, DMFA, 1993.

Cilji in kompetence:	**Objectives and competences:**
Poglobi znanje temeljnih konceptov in rezultatov funkcionalne analize.	Deepening the knowledge of fundamental concepts and results of functional analysis.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Banachovih prostorov • Hilbertovih prostorov • Teorije operatorjev Prenesljive/ključne spretnosti in drugi atributi: Pridobljeno znanje je podlaga tako za teoretično kot uporabno analizo na višji ravni.	Knowledge and Understanding: • Banach spaces • Hilbert spaces • Operator theory Transferable/Key Skills and other attributes: The obtained knowledge is a basis for both theoretical and applied analysis on an advanced level.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Seminarske vaje	• Lectures • Tutorial

Načini ocenjevanja: / Assessment:

Izpit: Pisni izpit – problemi, Ustni izpit – teorija. Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Opravljen pisni izpit – problemi je pogoj za pristop k ustnemu izpitu – Teorija. Pisni izpit – problemi se lahko	Delež (v %) / Weight (in %) 50% 50%	Exams: Written exam – problems, Oral exam – theory. Each of the mentioned assessments must be assessed with a passing grade. Passing grade of written exam – problems is required to take the oral exam – theory. Written exam – problems can be repalced with two mid-term tests.

nadomesti z dvema delnima testoma (sprotne obveznosti).	
Reference nosilca / Lecturer's references:	

1. EREMITA, Daniel. Biderivations on tensor products of algebras. *Communications in algebra*, ISSN 0092-7872, 2018, vol. 46, iss. 4, str. 1722-1726. http://doi.org/10.1080/00927872.2017.1355375, doi: 10.1080/00927872.2017.1355375.

2. EREMITA, Daniel. Commuting traces of upper triangular matrix rings. *Aequationes mathematicae*, ISSN 0001-9054, June 2017, vol. 91, iss. 3, str. 563-578. http://doi.org/10.1007/s00010-016-0462-7, doi: 10.1007/s00010-016-0462-7.

3. EREMITA, Daniel. Biderivations of triangular rings revisited. *Bulletin of the Malaysian Mathematical Society*, ISSN 0126-6705, Apr. 2017, vol. 40, iss. 2, str. 505-522. http://doi.org/10.1007/s40840-017-0451-6, doi: 10.1007/s40840-017-0451-6.

4. EREMITA, Daniel. Functional identities in upper triangular matrix rings. *Linear Algebra and its Applications*, ISSN 0024-3795. [Print ed.], 2016, vol. 493, str. 580-605. http://dx.doi.org/10.1016/j.laa.2015.12.022.

5. EREMITA, Daniel. Functional identities of degree 2 in triangular rings revisited. *Linear and Multilinear Algebra*, ISSN 0308-1087, 2015, vol. 63, iss. 3, str. 534-553. http://dx.doi.org/10.1080/03081087.2013.877012.