UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)			
Predmet:	Uvod v C* algebre		
Course title:	Introduction to C* algebras		

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Magistrski študijski program Finančna matematika	ni smeri	1 ali 2	prvi ali drugi
Master's study programme Financial Mathematics	none	1 or 2	first or second

Vrsta predmeta / Course type	izbirni / elective

Univerzitetna koda predmeta / University course code: M2117

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike** **študija**	**Samost. delo** **Individ. work**		**ECTS**
45		30			105		6

Nosilec predmeta / Lecturer: prof. dr. Matej Brešar, prof. dr. Bojan Magajna

Jeziki / **Languages:**	**Predavanja /** **Lectures:**	slovenski / Slovene, angleški / English
	Vaje / Tutorial:	slovenski / Slovene, angleški / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v letnik študija.	Enrolment in the programme.

Vsebina:	**Content (Syllabus outline):**

Banachove algebre: ideali, kvocienti, holomorfen funkcijski račun, šibka* topologija in Banach Alaoglujev izrek, Gelfandova transformacija. C*-algebre: urejenost, približna enota, ideali in kvocienti, karakterizacija komutativnih C*-algeber, zvezen funkcijski račun, stanja in upodobitve, univerzalna upodobitev. Operatorske topologije in aproksimacijski izreki: von Neumannov o bikomutantu, Kaplanskega o gostosti in Kadisonov o tranzitivnosti. Spektralni izrek za omejene normalne operatorje: Borelov funkcijski račun, komutativne von Neumannove algebre, grupna algebra .	Banach algebras: ideals, quotients, holomorphic functional calculus, weak* topology, Banach Alaoglu's theorem, Gelfand's transform. C*-algebras: order, approximate units, ideals, quotients, the characterization of commutative C*-algebras, continuous functional calculus, states and representations, the universal representation. Operator topologies and approximation theorems: von Neumann's bicommutation theorem, Kaplansky's density theorem and Kadison's transitivity theorem. The spectral theorem for bounded normal operators: the Borel functional calculus, commutative von Neumann algebras, the group algebra .

Temeljni literatura in viri / Readings:

G. K. Pedersen: Analysis Now, Springer, Berlin, 1989.

J. B. Conway: A Course in Functional Analysis, Springer, Berlin, 1978.

J. B. Conway: A Course in Operator Theory, GSM 91, Amer. Math. Soc., 2000.

R. V. Kadison in J. R. Ringrose: Fundamentals of theTtheory of Operator Algebras I, II, Graduate Studies in Math. 15, 16, Amer. Math. Soc., 1997.

I. Vidav: Banachove algebre, DMFA-založništvo, Ljubljana, 1982.

I. Vidav: Uvod v teorijo C*-algeber, DMFA-založništvo, Ljubljana, 1982.

N. Weaver: Mathematical Quantization, Chapman & Hall/CRC, London, 2001.

Cilji in kompetence:	**Objectives and competences:**
Spoznati osnovna orodja spektralne teorije in njihovo uporabo v C*-algebrah.	To master basic tools of spectral theory and their use in C*-algebras.

Predvideni študijski rezultati:

Znanje in razumevanje: pridobljeno osnovno znanje o C*-algebrah bo koristilo tudi izven matematike, npr. pri razumevanju kvantne fizike.

Uporaba: Pridobljeno znanje bo uporabno tudi drugod v matematični analizi in matematični fiziki.

Refleksija: C*-algebre so eno temeljnih aktivnih področij sodobne matematike.

Prenosljive spretnosti – niso vezane le na en predmet:

Formulacija in reševanje problemov z abstraktnimi metodami.

Intended learning outcomes:

Knowledge and understanding: the basic knowledge on C*-algebras may be useful also outside of mathematics, for example, it may facilitate the understanding of quantum physics.

Application: The acquired knowledge is applicable elsewhere in mathematics and mathematical physics.

Reflection: C*-algebras are one of the basic active fields of modern mathematics.

Transferable skills:

An approach to problems using abstract methods.

Metode poučevanja in učenja:

predavanja, vaje, domače naloge, konzultacije

Learning and teaching methods:

Lectures, exercises, homeworks, consultations

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
izpit iz vaj (2 kolokvija ali pisni izpit)		2 midterm exams instead of written exam, written exam
ustni izpit		
	50%	oral exam
Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)	50%	Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

Matej Brešar:

BREŠAR, Matej, KISSIN, Edward, SHULMAN, Victor S. Lie ideals: from pure algebra to C[star]-algebras. Journal für die Reine und Angewandte Mathematik, ISSN 0075-4102, vol. 2008, b. 623, str. 73-121. [COBISS.SI-ID 14931289]

BREŠAR, Matej, ŠPENKO, Špela. Determining elements in Banach algebras through spectral properties. Journal of mathematical analysis and applications, ISSN 0022-247X. [Print ed.], 2012, vol. 393, iss. 1, str. 144-150. [COBISS.SI-ID 16287833]

BREŠAR, Matej, MAGAJNA, Bojan, ŠPENKO, Špela. Identifying derivations through the spectra of their values. Integral equations and operator theory, ISSN 0378-620X, 2012, vol. 73, no. 3, str. 395-411. [COBISS.SI-ID 16339289]

Bojan Magajna:

MAGAJNA, Bojan. The Haagerup norm on the tensor product of operator modules. Journal of functional analysis, ISSN 0022-1236, 1995, let. 129, št. 2, str. 325-348. [COBISS.SI-ID 8098905]

BLECHER, David P., MAGAJNA, Bojan. Duality and operator algebras: automatic weak [ast] continuity and applications. Journal of functional analysis, ISSN 0022-1236, 2005, vol. 224, no. 2, str. 386-407. [COBISS.SI-ID 13633113]

MAGAJNA, Bojan. Fixed points of normal completely positive maps on B(H). Journal of mathematical analysis and applications, ISSN 0022-247X. [Print ed.], 2012, vol. 389, iss. 2, str. 1291-1302. [COBISS.SI-ID 16227673]