UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	**Fizika družbenih sistemov**
Course title:	**Physics of social systems**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Fizika		3	5
Physics			

Vrsta predmeta / Course type izbirni

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
60		15			105	6

Nosilec predmeta / Lecturer: Matjaž Perc

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

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

Prerequisits:

Osnove teorije verjetnosti.	Basic knowledge of probability theory

Vsebina:

Content (Syllabus outline):

Naključni sprehajalec in Berry-Esséen-ova teorema; Lévy-jevi stohastični procesi in limitni teorem stabilne porazdelitve; Stohastični modeli dinamike cen; Skale in korelacije v idealnih in realnih finančnih trgih; ARCH in GARCH procesi; Korelacije in antikorelacije med delnicami; Opcije v idealnih in realnih finančnih trgih.	Random walk and the two Berry-Esséen theorems; Lévy stochastic processes and the Limit theorem for stable distributions; Stochastic models of price dynamics; Scales and correlations in ideal and real financial markets; ARCH and GARCH processes; Correlations and anticorrelations between stocks; Options in ideal and real financial markets.

Temeljni literatura in viri / Readings:

- R. N. Mantegna in H. E. Stanley, An introduction to econophysics (Cambridge University Press, Cambridge, 2000).
- R. Cont in P. Tankov, Financial modelling with jump processes (Chapman & Hall, London, 2004).
- J. P. Bouchaud, M. Potters, Theory of Financial Risk and Derivative Pricing (Cambridge University Press, Cambridge, 2003)
- Chatterjee, S. Yarlagadda, B. K. Chakrabarti, Econophysics of Wealth Distributions (Springer-Verlag, Milan, 2005).

Cilji in kompetence:	Objectives and competences:
Ponuditi pregled ključnih konceptualnih pristopov, razvitih v okviru klasične fizike, katere je možno konstruktivno uporabiti v ekonomiji.	To provide an overview of key conceptual approaches, derived from classical physical sciences, which may be constructively applied in economy.

Predvideni študijski rezultati: **Intended learning outcomes:**

Znanje in razumevanje:	Knowledge and understanding:
Obvladovanje ključnih fizikalnih pristopov, ki so uporabni v družbenih vedah in ekonomiji ter sposobnost samostojnega nadaljnjega dela v tej smeri.	Mastering of key physical approaches that are applicable in the social sciences and the economy as well as the capability of pursuing research in an independent and autonomous manner.
Prenesljive/ključne spretnosti in drugi atributi:	**Transferable/Key Skills and other attributes:**
Sposobnost integracije v ekonomsko okolje in prosperiranje.	The ability to integrate in an economic environment and prosper.

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

Predavanja, vaje in samostojno delo.	Lectures, tutorial and individual work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
Ustni izpit	**80**	Oral exam
Seminarska naloga	**20**	Written seminar work

Reference nosilca / Lecturer's references:

GOSAK, Marko, PERC, Matjaž, KRALJ, Samo. The impact of static disorder on vibrational resonance in a ferroelectric liquid crystal. *Mol. cryst. liq. cryst. (Phila. Pa. : 2003)*, 2012, vol. 553, no. 1, str. 13-20, doi: 10.1080/15421406.2011.609343. [COBISS.SI-ID 18878472]

SZOLNOKI, Attila, PERC, Matjaž. Conditional strategies and the evolution of cooperation in spatial public goods games. *Phys. rev., E Stat. nonlinear soft matter phys. (Print)*, 2012, vol. 85, iss. 2, str. 026104-1-026104-7, graf. prikazi, doi: 10.1103/PhysRevE.85.026104. [COBISS.SI-ID 18940680]

WANG, Zhen, SZOLNOKI, Attila, PERC, Matjaž. Percolation threshold determines the optimal population density for public cooperation. *Phys. rev., E Stat. nonlinear soft matter phys. (Print)*, 2012, vol. 85, iss. 3, str. 037101-1-037101-4, doi: 10.1103/PhysRevE.85.037101. [COBISS.SI-ID 18986248]

LIU, Yongkui, CHEN, Xiaojie, ZHANG, Lin, WANG, Long, PERC, Matjaž. Win-stay-lose-learn promotes cooperation in the spatial prisoner's dilemma game. *PLoS one*, 2012, vol. 7, iss. 2, str. e30689-1-e30689-8, doi: 10.1371/journal.pone.0030689. [COBISS.SI-ID 18986504]

PERC, Matjaž. Sustainable institutionalized punishment requires elimination of second-order free-riders. *Scientific reports*, 2012, vol. 2, art. no. 344, 6 str., doi: 10.1038/srep00344. [COBISS.SI-ID 19071752]