UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Stohastični procesi
Course title:	Stochastic processes

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Fizika 2. st.		1,2	2,3
Physics 2nd degree		1,2	2,3

Vrsta predmeta / Course type	izbirni/ optional
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	0	60	0	0	180	10

Nosilec predmeta / Lecturer:	Matjaž Perc

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski/Slovenian in/and angleški/English
	Vaje / Tutorial:	slovenski/Slovenian in/and angleški/English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Osnove teorije verjetnosti, teorije dinamičnih sistemov in programiranja v poljubnem jeziku.	Basic knowledge of probability theory, dynamical system's theory, and programming skills in an arbitrary language.

Vsebina:	**Content (Syllabus outline):**
Stohastične spremenljive, Naključni dogodki in verjetnost, Stohastični procesi, Markovianski procesi, Master enačba, Fokker-Planckova enačba, Langevinski pristop, Stohastične diferenčne enačbe, Stohastične navadne diferencialne enačbe, Stohastične parcialne diferencialne enačbe, Levijevi leti.	Stochastic variables, Random events and the probability, Stochastic processes, Markov processes, Master equation, Fokker-Planck equation, Langevin approach, Stochastic difference equations, Ordinary stochastic differential equations, partial stochastic differential equations, Levy flights.

Temeljni literatura in viri / Readings:

N. G. Van Kampen, *Stochastic processes in physics and chemistry* (Elsevier, Amsterdam, 1992).
J. Honerkamp, *Stochastic dynamical systems* (VCH, New York 1994).
H. Risken, *The Fokker-Planck equation* (Springer, Berlin, 1984).
C. W. Gardiner, *Handbook of Stochastic Methods* (Springer, New York 2004).

Cilji in kompetence:	**Objectives and competences:**
Podati koncepte in metode, ki služijo za analizo in pridobitev razumevanja stohastičnih procesov v realnem svetu.	Students gain methods and concepts of key conceptual approaches and methods, which can be used to analyse and gain understanding of stochastic processes in the real world.

Intended learning outcomes:

Predvideni študijski rezultati:

Znanje in razumevanje: Obvladovanje osnovnih konceptov in metod, ki služijo za analizo in pridobitev razumevanja stohastičnih procesov v realnem svetu. Prenesljive/ključne spretnosti in drugi atributi: Sposobnost prepoznati in analizirati stohastične procese kjerkoli se pojavijo, in torej imeti možnost prosperirati v različnih znanstvenih disciplinah kot so ekonomija, kemija, fizika, medicina, itd..	Knowledge and Understanding: Mastering key conceptual approaches and methods, which can be used to analyse and gain understanding of stochastic processes in the real world. Transferable/Key Skills and other attributes: The ability to recognize and analyse stochastic processes wherever they may occur, and thus have the potential to prosper in diverse scientific disciplines such as: economy, chemistry, physics, medicine, etc..

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, teoretične vaje in individualno raziskovalno delo.	Lectures, theoretical exercises and individual research work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Ustni izpit Pisni izpit Seminarska naloga	40% 40% 20%	Oral exam Written exam 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]