



UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION

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|-----------------------|----------------------------------|
| Predmet: | Dinamika stohastičnih procesov |
| Subject Title: | Dynamics of stochastic processes |

| Študijski program Study programme | Študijska smer Study field | Letnik Year | Semester Semester |
|--------------------------------------|-------------------------------|----------------|----------------------|
| FIZIKA PHYSICS | / | 1 ali 2 | 1 ali 2 |

Univerzitetna koda predmeta / University subject code:

| Predavanja Lectures | Seminar Seminar | Sem. vaje Tutorial | Lab. vaje Labor work | Teren. vaje Field work | Samost. delo Individ. work | ECTS |
|------------------------|--------------------|-----------------------|-------------------------|---------------------------|-------------------------------------|------|
| 45 | 30 | | | | 375 | 15 |

Nosilec predmeta / Lecturer:

| | | |
|-------------------|------------------------------|---------------------|
| Jeziki / | Predavanja / Lecture: | Slovenski / Slovene |
| Languages: | Vaje / Tutorial: | Slovenski / Slovene |

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

Osnove teorije verjetnosti, teorije dinamičnih sistemov, programiranja v poljubnem jeziku in teorije stohastičnih procesov.

Prerequisites:

Basic knowledge of probability theory, dynamical system's theory, programming skills in an arbitrary language, and theory of stochastic processes.

Vsebina:

Dinamika linearnih stohastičnih procesov, dinamika nelinearnih stohastičnih procesov, aditivne vs. multiplikativne stohastične motnje, stohastična in koherentna resonanca, notranja stohastika, časovna vs. prostorska in časovno-prostorska dinamika, prostorska koherentna resonanca, karakterizacija dinamičnih invariant v prisotnosti šuma (napredne metode nelinearne analize časovnih vrst).

Content (Syllabus outline):

Dynamics of linear stochastic processes, dynamics of nonlinear stochastic processes, additive vs. multiplicative stochastic disturbances, stochastic and coherence resonance, Internal stochasticity, temporal vs. spatial and spatio-temporal stochastic dynamics, spatial coherence resonance, characterization of dynamical invariants in the presence of noise (advanced methods of nonlinear time series analysis).

Temeljni literatura in viri / Textbooks:

C. W. Gardiner, *Handbook of stochastic methods* (Springer, New York, 1995).
 N. G. Van Kampen, *Stochastic processes in physics and chemistry* (Elsevier, Amsterdam, 1992).
 H. Kantz in T. Schreiber, *Nonlinear time series analysis* (Cambridge University Press, Cambridge, 2002).
 H. D. I. Abarbanel, *Analysis of observed chaotic data* (Springer, New York, 1996).

Cilji:

Poglobiti znanje o stohastičnih procesih in njihovem vplivu na dinamiko linearnih in nelinearnih dinamičnih sistemov.

Objectives:

Deepen the knowledge about stochastic processes, specifically their impact on the dynamics of linear and nonlinear dynamical systems.

Predvideni študijski rezultati:

Znanje in razumevanje:

Obvladovanje naprednih konceptov in metod, ki služijo za analizo 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, biologija itd..

Intended learning outcomes:

Knowledge and Understanding:

Mastering advanced concepts and methods, which can be used to analyse 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, biology etc..

Metode poučevanja in učenja:

Predavanja, seminar, izdelava seminarske naloga.

Learning and teaching methods:

Lectures, seminar work.

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

Ustni izpit

Seminarska naloga

Delež (v %) /
Weight (in %)

60%

40%

Assessment:

Type (examination, oral, coursework, project):

Oral exam

Written seminar work