



UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION

Predmet:	Fizika živih bitij
Subject Title:	Physics of living beings

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
15	10				125	5

Nosilec predmeta / Lecturer:

Jeziki / Languages: **Predavanja / Lecture:** slovenski/Slovenian in/and angleški s slovenskim prevodom/English with translation in Slovenian
Vaje / Tutorial:

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

Prerequisites:

Vsebina:

Osnove

- Osnove statistične fizike
- Naključni sprehajalec in univerzalni modeli
- Samoorganizirana kritičnost
- Mali svet

Posamezna bitja

- Celice in zlom simetrije
- Genski zapis in vpliv okolice, naravna selekcija
- Velikost in skalno obnašanje, vzorci
- Detektorji
- Možgani, kvantni računalnik
- Smrt in evolucija

Skupina bitij

- Hierarhija
- Obnašanje (povezave, sebičnost in sodelovanje, izkazovanje, panika, čredni nagon, vojne, politika, pomen kazni), zapornikova dilema
- Simulacija učenja v razredu

Content (Syllabus outline):

Basics

- Basics of statistical physics
- Random walker and universal models
- Selforganized criticality
- Small world

Individual being

- Cells and symmetry breaking
- Genetics, influence of environment, selection pressures
- Size of creatures, scaling
- Detectors
- Brains, neuron cells, quantum computing
- Death and evolution

Group

- Hierarchy
- Behavior (connections, cooperation, altruism, panics, politics, punishment), prisoners dilemma
- Simulation of teaching in a class

Temeljni literatura in viri / Textbook:

- P. Bak, How Nature Works, The Science of Self-Organized Criticality, Springer Verlag, 1996.
- Murray Gell-Mann, Quark and Jaguar, W.H. Freeman and company, New York, 1994
- J.F.F. Mendes and N.S. Dorogovtsev, Evolution of Networks: From Biological Nets to the Internet and WWW, Oxford University Press, Oxford, 2003
- J. M. Smith, Evolution and the Theory of Games, Cambridge Univ. Press, Cambridge, 1982.

Cilji:

Študentje poglobijo znanje iz živih bitij.

Objectives:

Students acquire advanced knowledge on living beings.

Predvideni študijski rezultati:

Znanje in razumevanje:
Razumevanje procesov v živi naravi.

Prenesljive/ključne spretnosti in drugi atributi:
Rešitev problemov z matematičnimi orodji, numeričnimi metodami, univerzalnosti v fiziki in celosten pristop k reševanju problemov.

Intended learning outcomes:

Knowledge and Understanding:
Understanding of processes in living world.

Transferable/Key Skills and other attributes:
Solving of problems with mathematical tools, numerical methods, universalities in physics and gained global approach on solving a problem.

Metode poučevanja in učenja:

Metodika obsega teoretičen uvod v problematiko in reševanje posameznih problemov.

Learning and teaching methods:

They are based on theoretical introduction and solving of specific problems.

Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

Seminar

100

Seminar