

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Naključne spremenljivke
<b>Course title:</b>	Random variables

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Fizika 2. st.		1	2
Physics 2 <sup>nd</sup> degree		1	2

**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
30	0	60	0	0	210	10

**Nosilec predmeta / Lecturer:** Matjaž Perc

<b>Jeziki /</b>	<b>Predavanja / Lectures:</b>	slovenski/Slovenian
<b>Languages:</b>	<b>Vaje / Tutorial:</b>	slovenski/Slovenian

<b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b>	<b>Prerequisites:</b>
Ni pogojev.	None.

<b>Vsebina:</b>	<b>Content (Syllabus outline):</b>
Naključne spremenljive ternaključni 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.	Random 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, <i>Stochastic processes in physics and chemistry</i> (Elsevier, Amsterdam, 1992). J. Honerkamp, <i>Stochastic dynamical systems</i> (VCH, New York 1994). H. Risken, <i>The Fokker-Planck equation</i> (Springer, Berlin, 1984). C. W. Gardiner, <i>Handbook of Stochastic Methods</i> (Springer, New York 2004).
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<b>Cilji in kompetence:</b>	<b>Objectives and competences:</b>
Podati koncepte in metode, ki služijo za analizo in pridobitev razumevanja naključnih spremenljivk v realnem svetu.	Deliver methods and concepts of key conceptual approaches and methods, which can be used to analyse and gain understanding of random variables in the real world.

**Predvideni študijski rezultati:**

Znanje in razumevanje:

Obvladovanje osnovnih konceptov in metod, ki služijo za analizo in pridobitev razumevanja ključnih spremenljivk v realnem svetu.

Prenesljive/ključne spretnosti in drugi atributi:

Sposobnost prepoznati in analizirati naključne spremenljivke kjerkoli se pojavijo, in torej imeti možnost prosperirati v različnih znanstvenih disciplinah kot so ekonomija, kemija, fizika, medicina, in sociologija..

**Intended learning outcomes:**

Knowledge and Understanding:

Mastering key conceptual approaches and methods, which can be used to analyse and gain understanding of random variables in the real world.

Transferable/Key Skills and other attributes:

The ability to recognize and analyse random variables wherever they may occur, and thus have the potential to prosper in diverse scientific disciplines such as: economy, chemistry, physics, medicine, and sociology.

**Metode poučevanja in učenja:**

Predavanja, projektno delo.

**Learning and teaching methods:**

Lectures, project work.

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %)

**Assessment:**

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Ustni izpit	50%	Oral exam
Opravljeno projektno delo	50%	Done project work

**Reference nosilca / Lecturer's references:**

KHAJANCHI, Subhas, PERC, Matjaž, GHOSH, Dibakar. The influence of time delay in a chaotic cancer model. *Chaos*, ISSN 1054-1500, 2018, vol. 28, iss. 10, 103101-1-103101-13, doi: 10.1063/1.5052496. [COBISS.SI-ID 24281352], [JCR, SNIP, WoS do 12. 5. 2019: št. citatov (TC): 3, čistih citatov (CI): 3, Scopus do 29. 4. 2019: št. citatov (TC): 3, čistih citatov (CI): 3]

HELBING, Dirk, BROCKMANN, Dirk, CHADEFaux, Thomas, DONNAY, Karsten, BLANKE, Ulf, WOOLLEY-MEZA, Olivia, MOUSSAID, Mehdi, JOHANSSON, Anders, KRAUSE, Jens, SCHUTTE, Sebastian, PERC, Matjaž. Saving human lives : what complexity science and information systems can contribute. *Journal of statistical physics*, ISSN 0022-4715, 2015, vol. 158, iss. 3, str. 735-781, doi: [10.1007/s10955-014-1024-9](https://doi.org/10.1007/s10955-014-1024-9). [COBISS.SI-ID [21182728](https://doi.org/10.1007/s10955-014-1024-9)], [JCR, SNIP, WoS do 12. 5. 2019: št. citatov (TC): 104, čistih citatov (CI): 100, Scopus do 28. 5. 2019: št. citatov (TC): 128, čistih citatov (CI): 124]

LI, Xiaodi, CAO, Jinde, PERC, Matjaž. Switching laws design for stability of finite and infinite delayed switched systems with stable and unstable modes. *IEEE access*, ISSN 2169-3536, 2018, vol. 6, str. 6677-6691, doi: 10.1109/ACCESS.2017.2789165. [COBISS.SI-ID 23697416], [JCR, SNIP, WoS do 10. 2. 2019: št. citatov (TC): 7, čistih citatov (CI): 7, Scopus do 29. 5. 2019: št. citatov (TC): 9, čistih citatov (CI): 9]

RIBEIRO, Haroldo V., ALVES, Luiz G. A., MARTINS, Alvaro F., LENZI, Ervin K., PERC, Matjaž. The dynamical structure of political corruption networks. *Journal of complex networks*, ISSN 2051-1329. [Online ed.], 2018, vol. 6, iss. 6, str. 989-1003, doi: 10.1093/comnet/cny002. [COBISS.SI-ID 24363272], [SNIP, WoS do 12. 5. 2019: št. citatov (TC): 3, čistih citatov (CI): 3, Scopus do 29. 5. 2019: št. citatov (TC): 6, čistih citatov (CI): 6]

NARIN, Ali, ISLER, Yalcin, OZER, Mahmut, PERC, Matjaž. Early prediction of paroxysmal atrial fibrillation based on short-term heart rate variability. *Physica. A, Statistical mechanics and its applications*, ISSN 0378-4371. [Print ed.], 2018, vol. 509, str. 56-65, doi: 10.1016/j.physa.2018.06.022. [COBISS.SI-ID 24163848], [JCR, SNIP, WoS do 1. 2. 2019: št. citatov (TC): 1, čistih citatov (CI): 0, Scopus do 29. 4. 2019: št. citatov (TC): 2, čistih citatov (CI): 1]