| UČNI NAČRT PREDMETA / COURSE SYLLABUS | |
|---|---|
| **Predmet:** | **Računska fizika** |
| **Course title:** | **Computational physics** |

| Študijski program in stopnja<br>Study programme and level | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|---|---|---|---|
| **Fizika, 1. stopnja** | | **1** | **1** |
| **Physics, 1st cycle** | | | |

| | |
|---|---|
| **Vrsta predmeta / Course type** | Obvezni/Compulsory |
| **Univerzitetna koda predmeta / University course code:** | |

| Predavanja<br>Lectures | Seminar<br>Seminar | Vaje<br>Tutorial | Lab. vaje<br>Laboratory work | Terenske vaje<br>Field work | Samost. delo<br>Individ. work | ECTS |
|---|---|---|---|---|---|---|
| **45** | | | **45** | | **90** | **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:** | **Prerequisites:** |
|---|---|
| Ni pogojev za vključitev v delo.<br><br>Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno. Opravljeno laboratorijsko delo je pogoj za pristop k ustnemu izpitu. | There are no prerequisites to join the course.<br><br>Each of the listed obligations in the assessment methods must be completed with a positive grade. Completed laboratory work is a prerequisite for taking the oral exam. |

| **Vsebina:** | **Content (Syllabus outline):** |
|---|---|
| Zgradba in delovanje računalnika. Računalnik pri delu v fiziki: risanje diagramov: različne oblike diagramov, prilagoditvene krivulje, prikaz napak, združevanje diagramov, osnovne računske tehnike, odvajanje in integriranje z računalniškimi orodji, priprava fizikalnega teksta, urejevalniki enačb, predstavitve, shranjevanje in prenos podatkov med različnimi programi, pošiljanje podatkov, osnovne meritve z računalnikom, pregled računalniških orodij za fiziko. | Computer architecture and operation<br>Computer in physics diagram drawing: diagram types, fitting curves, error presentation, diagram joining, basic computer techniques, numerical derivation and integration with the computer tools, physics text preparation, equation editors, presentation, data shearing, storing and transmission, computer easurement, physics software tools |

**Temeljni literatura in viri / Readings:**

- K. N. Anagnostopoulos, Computational Physics: A Practical Introduction to Computational Physics and Scientific Computing (National Technical University of Athens, Athens, 2016) prosto dostopno: https://open.umn.edu/opentextbooks/textbooks/computational-physics-a-practical-introduction-to-computational-physics-and-scientific-computing-using-c
- R. Fitzpatrick, Computational Physics (The University of Texas at Austin, Texas, 2006) prosto dostopno: https://farside.ph.utexas.edu/teaching/329/329.pdf
- D. Kodek: Arhitektura računalniških sistemov, Bi-tim, Ljubljana, 2000.

Dodatna literatura / Additional readings:

- A. S. Tanenbaum: Structured Computer Organization, Third Edition, Prentice-Hall, 1990.
- D. A. Patterson, J. L. Hennesy: Computer Architecture A Quantitative Approach, Morgan Kaufman Publishers, INC. San Mateo, California, 1991.

Ostala literatura, ki se zaradi hitro razvijajočega področja spreminja, bo podana na predavanjih.

| **Cilji in kompetence:** | **Objectives and competences:** |
|---|---|
| Uporaba osnovnih računalniških orodij pri laboratorijskem delu in pri pisanju fizikalnih tekstov. | The application of software tools in laboratory work and creation of physics text. |

| **Predvideni študijski rezultati:** | **Intended learning outcomes:** |
|---|---|
| **Znanje in razumevanje:**<br>Študent zna z računalniškimi orodji obdelati in prikazati rezultate meritev. Pri strokovnem pisanju uporablja računalnik.<br><br>**Prenesljive/ključne spretnosti in drugi atributi:**<br>Delo z računalnikom je posebej pomembno pri vseh laboratorijskih vajah, pri seminarjih in diplomski nalogi. | **Knowledge and understanding:**<br>Student knows to work with the computer tools and evaluate the results. He/she uses computer in the physics vocation.<br><br>**Transferable/Key Skills and other attributes:**<br><br>Work with the computer in laboratory, seminar work and diploma papers. |

| **Metode poučevanja in učenja:** | **Learning and teaching methods:** |
|---|---|
| Predavanja<br>Laboratorijsko delo | Lectures<br>Laboratory work |

| **Načini ocenjevanja:** | Delež (v %) / Weight (in %) | **Assessment:** |
|---|---|---|

| | | |
|---|---|---|
| Laboratorijsko delo | **50** | Laboratory work |
| Ustni izpit | **50** | Oral exam |

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

**1.** IZGI, Burhaneddin, ÖZKAYA, Murat, ÜRE, Nazim Kemal, PERC, Matjaž. A holistic matrix norm-based alternative solution method for Markov reward games. *Applied mathematics and computation*. [Print ed.]. Mar. 2025, vol. 488, [article no.] 129124, 13 str. ISSN 0096-3003. DOI: 10.1016/j.amc.2024.129124. [COBISS.SI-ID 213539331]

**2.** MAO, Shuai, MISHRA, Yateendra, TIAN, Yu-Chu, PERC, Matjaž, TANG, Yang. Distributed online optimization with edge-based event-triggered communication. *Automatica*. [Print ed.]. 2025, vol. 173, [article no.] 112068, 15 str. ISSN 0005-1098. DOI: 10.1016/j.automatica.2024.112068. [COBISS.SI-ID 221010691]

**3.** BANERJEE, Ranjib, ACHARYA, Sayan, PERC, Matjaž, GHOSH, Dibakar. Anomalous complete synchronization in relay oscillators. *Chaos, solitons and fractals*. [Print ed.]. 2025, vol. 193, [article no.] 116069, 7 str. DOI: 10.1016/j.chaos.2025.116069. [COBISS.SI-ID 226119427]

**4.** ZHANG, Yichao, WANG, Jiasheng, WEN, Guanghui, GUAN, Jihong, ZHOU, Shuigeng, CHEN, Guanrong, CHATTERJEE, Krishnendu, PERC, Matjaž. Limitation of time promotes cooperation in structured collaboration systems. *IEEE transactions on network science and engineering*. 2025, vol. 12, no. 1, str. 4-12. ISSN 2327-4697. DOI: 10.1109/TNSE.2024.3481434. [COBISS.SI-ID 221187331]

**5.** ROY, Sourav, MAJHI, Soumen, PERC, Matjaž, GHOSH, Dibakar. Transitive to cyclic dominance in eco-evolutionary dynamics of strategic species. *Proceedings of the royal society A. Mathematical, Physical and Engineering Sciences*. [Online ed.]. Feb. 2025, vol. 481, iss. 2307, [article no.] 20240734, 24 str. ISSN 1471-2946. DOI: 10.1098/rspa.2024.0734. [COBISS.SI-ID 227067651]

**6.** MARHL, Marko, MARKOVIČ, Rene, GRUBELNIK, Vladimir, PERC, Matjaž. The changing world dynamics of research performance. *Scientometrics*. 2025, vol. 130, str. 469-488. ISSN 1588-2861. DOI: 10.1007/s11192-024-05199-6, DOI: 20.500.12556/DKUM-91828. [COBISS.SI-ID 225609219]