

| UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)                  |                           |                                      |                              |                                    |                                      |                             |  |
|--|---------------------------|--------------------------------------|------------------------------|------------------------------------|--------------------------------------|-----------------------------|--|
| <b>Predmet:</b>  |                           | Fizika 2                             |                              |                                    |                                      |                             |  |
| <b>Course title:</b>   |                           | Physics 2                            |                              |                                    |                                      |                             |  |
| <b>Študijski program in stopnja</b><br>Study programme and level             |                           | <b>Študijska smer</b><br>Study field |                              | <b>Letnik</b><br>Academic year     |                                      | <b>Semester</b><br>Semester |  |
| Univerzitetni študijski program<br>Matematika                                |                           | ni smeri                             |                              | 2                                  |                                      | prvi                        |  |
| First cycle academic study<br>programme Mathematics                          |                           | none                                 |                              | 2                                  |                                      | first                       |  |
| <b>Vrsta predmeta / Course type</b>  |                           |                                      |                              | obvezni / compulsory               |                                      |                             |  |
| <b>Univerzitetna koda predmeta / University course code:</b>                 |                           |                                      |                              | M0211                              |                                      |                             |  |
| <b>Predavanja</b><br>Lectures  | <b>Seminar</b><br>Seminar | <b>Vaje</b><br>Tutorial              | <b>Klinične vaje</b><br>work | <b>Druge oblike</b><br>študija     | <b>Samost. delo</b><br>Individ. work | <b>ECTS</b>                 |  |
| 45   | 15                        | 30                                   |                              |                                    | 90                                   | 6                           |  |
| <b>Nosilec predmeta / Lecturer:</b>  |                           | prof. dr. Anton Ramšak               |                              |                                    |                                      |                             |  |
| <b>Jeziki / Languages:</b>   |                           | <b>Predavanja / Lectures:</b>        |                              | slovenski / Slovene                |                                      |                             |  |
|  |                           | <b>Vaje / Tutorial:</b>              |                              | slovenski / Slovene                |                                      |                             |  |
| <b>Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:</b> |                           |                                      |                              | <b>Prerequisites:</b>              |                                      |                             |  |
| Vpis v letnik študija.   |                           |                                      |                              | Enrolment in the programme.        |                                      |                             |  |
| <b>Vsebina:</b>  |                           |                                      |                              | <b>Content (Syllabus outline):</b> |                                      |                             |  |

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| <p>Elektromagnetno polje. Coulombov in Gaussov zakon. Električni potencial. Električni tok, Ohmov zakon. Izmenični tok. Magnetno polje, Lorentzova sila, gibanje nabitih delcev. Magnetni pretok, indukcija. Maxwellove enačbe v integralni obliki. Simetrija med električnimi in magnetnimi pojavi.</p> <p>Valovanje. Valovanje v eni dimenziji, različni primeri valovne enačbe, struna, zvok, elektromagnetno valovanje. Odboj, lom, disperzija, polarizacija. Interferenca, uklon.</p> <p>Specialna teorija relativnosti. Prostor-čas. Lorentzova transformacija. Relativistična kinematika, relativnost časa in razdalje. Relativistična dinamika: sila Minkowskega, četverec gibalne količine, energija.</p> | <p>Electromagnetic field. Coulomb's and Gauss's law. Electric potential. Electric current, Ohm's law. Alternating current. Magnetic field, Lorentz force, charged particles. Magnetic flux, induction. Maxwell's equations in integral form. The symmetry between electric and magnetic phenomena.</p> <p>Waves. Waves in one dimension, different examples of the wave equation, string, sound, electromagnetic waves. Reflection, refraction, dispersion, polarization. Interference, diffraction.</p> <p>The special theory of relativity. Space-time. Lorentz transformation. Relativistic kinematics, the relativity of time and distance. Relativistic dynamics: Minkowski force, Four-force, energy.</p> |
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**Temeljni literatura in viri / Readings:**

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| <p>Izbrana poglavja iz knjig:</p> <p>J. Strnad: Fizika. Del 2, DMFA-založništvo, 1995.</p> <p>R. Kladnik: Osnove fizike. Del 2, Državna založba Slovenije, 1977.</p> <p>D. Halliday, R. Resnick, J. Walker: Fundamentals of Physics, John Wiley &amp; Sons, 2005.</p> |
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**Cilji in kompetence:**

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| <p>Poglobitev znanja iz osnov fizike s primeri, predstavljenimi z eksperimenti, kjer slušatelji spoznajo tudi metode merjenja različnih fizikalnih količin</p> |
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**Objectives and competences:**

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| <p>Enhancement of knowledge of basic physics by cases, presented by experiments, where students also learn of different methods of measuring physical quantities.</p> |
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**Predvideni študijski rezultati:**

Znanje in razumevanje: Poznavanje osnovnih sil v naravi: električne, magnetne, gravitacijske. Obvladovanje osnovnih pojmov in principov posebne teorije relativnosti.

Uporaba: Pridobljeno znanje fizike služi slušateljem kot primer za uporabo matematičnih metod (sistem linearnih enačb, odvod, integral, diagonalizacija matrik).

Refleksija: Uporaba matematičnega pristopa in formalizma na konkretnih fizikalnih primerih.

Prenosljive spretnosti – niso vezane le na en predmet: Spoznavanje z metodologijo uporabe fizikalnih teorij pri opazovanju pojavov v naravi: postavitve teoretičnega modela, definiranje fizikalnih količin in spremenljivk, ki nastopajo v modelu, in primerjava z izmerjenimi količinami.

**Intended learning outcomes:**

Knowledge and understanding: Understanding of basic forces in nature: electrical, magnetic, and gravitational. The understanding of basic terms and principles of special theory of relativity.

Application: Acquired knowledge of physics can be used for building examples for the use of mathematical models (systems of linear equations, derivative, integral, matrix diagonalization).

Reflection: The use of mathematical approach and formalism on concrete physical examples.

Transferable skills: Introduction to the methodology of using physical theories in observing phenomena in nature: building a theoretical model, definition of physical quantities and the variables that appear in the model, and comparison with measured quantities.

**Metode poučevanja in učenja:**

Predavanja, seminar, vaje, domače naloge, konzultacije

**Learning and teaching methods:**

Lectures, seminar, exercises, homework, consultations

**Načini ocenjevanja:**

Delež (v %) /

Weight (in %) **Assessment:**

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| Način (pisni izpit, ustno izpraševanje, naloge, projekt):                | 50% | Type (examination, oral, coursework, project):                         |
| 2 kolokvija namesto izpita iz vaj, izpit iz vaj,<br><br>izpit iz teorije | 50% | 2 midterm exams instead of written exam, written exam<br><br>oral exam |
| ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)                 |     | grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)      |

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

RAMŠAK, Anton, HORSCH, Peter. Spin polarons in the t-J model : shape and backflow. Physical review. B, Condensed matter, ISSN 0163-1829, 1993, vol. 48, str. 10559-10562. [COBISS.SI-ID 8194855]

PRELOVŠEK, Peter, RAMŠAK, Anton, SEGA, Igor. c-axis conductivity in the normal state of cuprate superconductors. Physical review letters, ISSN 0031-9007. [Print ed.], 1998, 81, str. 3745-3748. [COBISS.SI-ID 777828]

RAMŠAK, Anton, REJEC, Tomaž, JEFFERSON, J. H. Effect of deconfinement on resonant transport in quantum wires. Physical review. B, Condensed matter and materials physics, ISSN 1098-0121, 1998, 58, str. 4014-4018. [COBISS.SI-ID 778084]