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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Atomika in optika | | | | | | | | | | | | | | |
| **Course title:** | | | Atomics and optics | | | | | | | | | | | | | | |
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| **Študijski program in stopnja**  **Study programme and level** | | | | | **Študijska smer**  **Study field** | | | | | | | | **Letnik**  **Academic year** | | **Semester**  **Semester** | | |
| Univerzitetni študij 1. stopnje Elektrotehnika | | | | | **Ni smeri** | | | | | | | | **1.** | | **zimski** | | |
| 1st cycle academic study programme Electrical Engineering | | | | | **/** | | | | | | | | **1.** | | **winter** | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | Obvezni – splošni/ compulsory general | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64148 | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| 60 |  | | | 45 | | |  | | | |  | | | **95** | |  | 8 |
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| **Nosilec predmeta / Lecturer:** | | | | | Aleš Iglič | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | **Predavanja / Lectures:** | | | | slovenski / Slovenian /angleški /English | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | slovenski / Slovenian /angleški /English | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | |  | **Prerequisits:** | | | | | | | |
| Vpis v letnik. | | | | | | | | |  | Enrolment in the year of the course. | | | | | | | |
| **Vsebina:** | | | | | | | |  | | **Content (Syllabus outline):** | | | | | | | |
| Fizikalne osnove elektromagnetizma, fizikalni modeli električnega prevajanja v kovinah in elektrolitih, fizikalni modeli diamagnetizma, paramagnetizma in feromagnetizma, Poissonova enačba, Poisson-Boltzmannova enačba in električna dvojna plast, modeliranje dielektričnih lastnosti trdnih snovi in tekočin, elektromagnetno valovanje z valovno optiko, frekvenčna odvisnost lomnega količnika, totalni odboj in optična vlakna, fotometrija, geometrijska optika, posebna teorija relativnosti in interakcije med delci, fotoefekt, sevanje črnega telesa, rentgenski žarki in njihova uporaba, Bohrov model atoma in črtasti emisijski spektri, eksperimentalne osnove, principi ter osnovne enačbe kvantne mehanike, nekaj preprostih primerov iz kvantne mehanike, energijski pasovi v izolatorjih, prevodnikih in polprevodnikih. | | | | | | | |  | | Experimental basis and principles of the theory of electromagnetism, modelling of electric current in metals and electrolytes, physical models of diamagnetism, paramagnetism and ferromagnetism, Poisson equation, Poisson-Boltzmann equation and electric double layer, dielectric properties of solids and liquids electromagnetic waves and wave optics, frequency dependent refractive index, total internal reflection and optical fibres, photometry, geometrical optics, special theory of relativity and particle interactions, photoelectric effect , black-body radiation, the nature of X-rays and some of their applications, Bohr model and line atomic emission spectra, experimental basis, principles and basic equations of quantum mechanics , some simple examples described by using the methods of quantum mechanics, energy band structure in insulators, conductors and semiconductors. | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| 1.Raymond A. Serway: Physics (international edition), Sounders Golden Sunburst Series (vsakokratna nova izdaja)  <http://physics.fe.uni-lj.si/students/predavanja/zapiski_iglic_fiz2.html>  2.A. Iglič: Električne lastnosti snovi, Fakulteta za elektrotehniko, Založba FE in FRI, vsakokratna nova izdaja  se nahaja tudi na: <http://physics.fe.uni-lj.si/students/predavanja/zapiski_iglic_fiz2.html>3.. J. Strnad: Fizika 2. del: Elektrika, optika, DMFA (najnovejša izdaja)  4. J. Strnad: Fizika 3. del: Posebna teorija relativnosti, kvantna fizika, atomi (najnovejša izdaja)  5. T. Gyergyek, V. Kralj-Iglič, A. Iglič, M. Fošnarič: Vaje iz fizike II, Založba FE in FRI, vsakokratna nova izdaja  se nahaja na: <http://physics.fe.uni-lj.si/students/predavanja/zapiski_iglic_fiz2.html> | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Pridobljeno znanje naj študentom omogoči razumevanje električnih in magnetnih lastnosti snovi, ki so pomembne v elektrotehniki. Študenti bodo pridobili splošne osnove tehnične in naravoslovne izobrazbe ter sposobnosti logičnega naravoslovnega in tehničnega razmišljanja. | |  | | The acquired knowledge will enable the students to understand the electrical and magnetic properties of the materials important in electrical engineering. The students will acquire a general education in technical and natural sciences and gain better understanding of theoretical and experimental methods in natural and technical sciences. | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Razumevanje temeljnih fizikalnih in elektrotehničnih zakonitosti v snovi.  Opis možne uporabe pridobljenega znanja na različnih področjih elektrotehnike. | | |  | Basic knowledge of electrical properties of materials. The application of the acquired knowledge in different fields of electrotechnics. | |
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| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Predavanja, vaje, demonstracijski poskusi med predavanji, obiski znanstvenih inštitutov, predavanja gostujočih profesorjev iz tujine. | | |  | Lectures, tutorials, demonstrative experiments during lectures and lectures of visiting professors from abroad. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Način: pisni izpit, ustni izpit, projekt  Ocene od 1 do vključno 5 so negativne, ocene od vključno 6 do 10 so pozitivne.  Pozitivna ocena pisnega izpita je pogoj za pristop k ustnem izpitu.  Prispevki k oceni:  pisni izpit  ustno izpraševanje  projekt | 40 %  50 %  10 % | | | | Type: written examination, oral examination, project  Negative grades: from 1 to 5, positive grades: from 6 to 10.  Positive evaluation of written examination is a prerequisite for the oral examinations.  Contributions to final grade:  written examination  oral examination  project |
| **Reference nosilca / Lecturer's references:** | | | | | |
| 1.KULKARNI, Mukta Vishwanath, MAZARE, Anca, SCHMUKI, Patrik, IGLIČ, Aleš. Influence of anodization parameters on morphology of TiO2 nanostructured surfaces. Advanced Materials Letters, 2016, vol. 7, no. 1, str. 23-28.  2.GONGADZE, Ekaterina, IGLIČ, Aleš. Asymmetric size of ions and orientational ordering of water dipoles in electric double layer model - an analytical mean-field approach. Electrochimica Acta, 2015, vol. 178, str. 541-545.  3.VELIKONJA, Aljaž, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. On asymmetric shape of electric double layer capacitance curve. International Journal of Electrochemical Science, 2015, vol. 10, no. 1, str. 1-7.  4.IMANI, Roghayeh, PAZOKI, Meysam, TIWARI, Ashutosh, BOSCHLOO, Gerrit, TURNER, Anthony P. F., KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. Band edge engineering of TiO2@DNA nanohybrids and implications for capacitive energy storage devices. Nanoscale, 2015, vol. 7, no. 23, str. 10438-10448.  5.GONGADZE, Ekaterina, VELIKONJA, Aljaž, SLIVNIK, Tomaž, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. The quadrupole moment of water molecules and the permittivity of water near a charged surface. Electrochimica Acta, 2013, vol. 109, str. 656-662. | | | | | |