|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Fizika snovi | | | | | | | | | | | | | | | | |
| **Course title:** | | | Physics of Matter | | | | | | | | | | | | | | | | |
|  | | | | |  | | | | | | | | | |  | |  | | |
| **Študijski program in stopnja**  **Study programme and level** | | | | | **Študijska smer**  **Study field** | | | | | | | | | | **Letnik**  **Academic year** | | **Semester**  **Semester** | | |
| Podiplomski magistrski študijski program druge stopnje Elektrotehnika | | | | | Vse smeri | | | | | | | | | | 2 | | 1 | | |
| 2nd cycle masters study programme in Electrical Engineering | | | | | All study fields | | | | | | | | | | 2 | | 1 | | |
|  | | | | | | | | | | | | | | | | | | | |
| **Vrsta predmeta / Course type** | | | | | | | | | | | | | | Izbirni-splošni /elective general | | | | | |
|  | | | | | | | | | | | | | |  | | | | | |
| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | | | 64312 | | | | | |
|  | | | | | | | | | | | | | | | | | | | |
| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | | **Klinične vaje**  **work** | | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| 60 |  | | | 15 | | | | **-** | | | | |  | | | 75 | |  | 6 |
|  | | | | | | | | | | | | | | | | | | | |
| **Nosilci predmeta / Lecturers:** | | | | | Tomaž Gyergyek, Veronika Kralj-Iglič | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | |
| **Jeziki /**  **Languages:** | | **Predavanja / Lectures:** | | | | slovenski in po potrebi angleški / Sloveneian and English, if necessary | | | | | | | | | | | | | |
| **Vaje/Seminarji :** | | | | slovenski in po potrebi angleški / Sloveneian and English, if necessary | | | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | |  | | **Prerequisits:** | | | | | | | | |
| Vpis v letnik predmeta | | | | | | | | |  | | Enrolment in the year of the course | | | | | | | | |
| **Vsebina:**  Eksperimentalne osnove kvantne mehanike. Principi kvantne mehanike. Nekaj preprostih primerov iz kvantne mehanike. Vodikov atom. Atomi z več elektroni. Osnove statistične termodinamike. Elektronski plin. Samoorganizacija molekul. Fizika elektrolitov. Elektroni v kovinah. Električni tok v snovi. Energijski pasovi v kristalih. Polprevodniki. Dielektrične lastnosti snovi. Magnetne lastnosti snovi. Superprevodnost. Osnove mehanike kontinuov in hidrodinamike. Kinetični in magnetohidrodinamski (MHD) opis plinske plazme. | | | | | | | | |  | | **Content (Syllabus outline):**  Experimental basis and principles of quantum mechanics. Some simple examples described by using the methods of quantum mechanics. Hydrogen atom and other atoms. The basis of statistical thermodynamics. Electron gas. Self-assembly of molecules. Electrons in metals. Electric current in metals. Energy bands in crystals. Semiconductors. Dielectric properties of solids, liquids and gases. Magnetic properties of materials. Superconductivity. The basis of mechanics of continuous media and hydrodynamics. Plasma physics, kinetic and magnetohydrodynamic (MHD) description of plasmas. | | | | | | | | |
| **Temeljni literatura in viri / Readings:** | | | | | | | | | | | | | | | | | | | |
| 1. J. Strnad, Fizika III in IV del, DZS, Ljubljana, vsakokratna nova izdaja 2. L. Solymar, D. Walsh, Lectures on the electrical properties of materials, Clarendon Press, Oxford, 1970. 3. S. Poberaj, Fizika snovi, Založba FE in FRI, 1976. 4. B.H. Brandsen, C.J. Joachain, Quantum Mechanics, Prentice Hall, vsakokratna nova izdaja. 5. R. A. Serway: Physics (international edition), Sounders Golden Sunburst Series, vsakokratna nova izdaja. 6. A. Iglič: Električne lastnosti snovi, Založba FE in FRI, 2009. 7. A. Iglič, D. Drobne, V. Kralj-Iglič, Nanostructures in Biological Systems, Pan Stanford, Singapore, 2013 (in print). 8. I. Supek, Teorijska fizika i struktura materije, Školska knjiga Zagreb, 1990. | | | | | | | | | | | | | | | | | | | |
| **Cilji in kompetence:** | | | | | | | | | |  | | **Objectives and competences:** | | | | | | | |
| Pridobljeno znanje naj študentom omogoči razumevanje električnih lastnosti snovi, med drugim lastnosti polprevodnikov, kovin, superprevodnikov, elektronskega plina, elektrolitskih raztopin in plinske plazme na nivoju, ki se ga pričakuje od magistra elektrotehnike. | | | | | | | | | |  | | The acquired knowledge will enable the students to understand the electrical properties of the materials like semiconductors, metals, superconductors, electronic gases, electrolyte solutions and plasma gases. | | | | | | | |
| **Predvideni študijski rezultati:** | | | | | | | | | |  | | **Intended learning outcomes:** | | | | | | | |
| 1.Znanje in razumevanje znanje osnov kvantne mehanike in statistične fizike  2.Uporaba pridobljenih matematičnih znanj pri delu z materiali na raznih področjih elektrotehnike  3.Razumevanje električnih lastnosti snovi | | | | | | | | | |  | | 1.Knowledge and understanding of basics of quantum mechanics and statistical thermodynamics  2.The application of the acquired mathematical knowledge in different fields of electrotechnics  3.The profound knowledge of electrical properties of materials | | | | | | | |
|  | | | | | | | | | |  | |  | | | | | | | |
| **Metode poučevanja in učenja:** | | | | | | | | | |  | | **Learning and teaching methods:** | | | | | | | |
| Predavanja, seminarji/računske vaje. | | | | | | | | | |  | | Lectures, seminars/problem solving. | | | | | | | |
| **Načini ocenjevanja:** | | | | | | | Delež (v %) /  Weight (in %) | | | | | | **Assessment:** | | | | | | |
| Ocene od 1 do vključno 5 so negativne, ocene od vključno 6 do 10 so pozitivne.  Prispevki k oceni:  projekt  seminar | | | | | | | 50%  50% | | | | | | Negative grades: from 1 to 5, positive grades: from 6 to 10.  Contributions to final grade:  project  seminar | | | | | | |
| **Reference nosilca / Lecturer's references:** | | | | | | | | | | | | | | | | | | | |
| 1. GRUENWALD, Johannes, TSKHAKAYA, David, KOVAČIČ, Jernej, ČERČEK, Milan, GYERGYEK, Tomaž, IONITA, Codrina, SCHRITTWIESER, Roman. Comparison of measured and simulated electron energy distribution functions in low-pressure helium plasmas. Plasma sources sci. technol., 2013 vol. 22, str. 015023- 2. GYERGYEK, Tomaž, KOVAČIČ, Jernej. Saturation of a floating potential of an electron emitting electrode with increased electron emission : a one-dimensional kinetic model and particle-in-cell simulation. Phys. plasmas, 2012, vol. 19, str. 013506. 3. GYERGYEK, Tomaž, KOVAČIČ, Jernej, ČERČEK, Milan. Potential formation in front of an electron emitting electrode immersed in a plasma that contains a monoenergetic electron beam. Phys. plasmas, 2010, vol. 17, no. 8, str. 083504. 4. SLOKAR, Tanja, LÓPEZ-MARISCAL, Carlos, KREK, Judita Lea, ŠTUKELJ, Roman, ZUPANC, Oskar, KRALJ-IGLIČ, Veronika. Effect of lidocaine and epinephrine on human erythrocyte shape and vesiculability of blood cells. Advances in condensed matter physics, ISSN 1687-8108, 2015, vol. 2015, str. 870602-1-870602-10. <http://dx.doi.org/10.1155/2015/870602>, doi: [10.1155/2015/870602](http://dx.doi.org/10.1155/2015/870602). 5. DRAŠLER, Barbara, DROBNE, Damjana, NOVAK, Sara, VALANT, Janez, BOLJTE, Sabina, OTRIN, Lado, RAPPOLT, Michael, SARTORI, Barbara, IGLIČ, Aleš, KRALJ-IGLIČ, Veronika, ŠUŠTAR, Vid, MAKOVEC, Darko, GYERGYEK, Sašo, HOČEVAR, Matej, GODEC, Matjaž, ZUPANC, Jernej. Effects of magnetic cobalt ferrite nanoparticles on biological and artificial lipid membranes. International journal of nanomedicine, ISSN 1178-2013. [Online ed.], 2014, vol. 9, no. 1, str. 1559-1581 | | | | | | | | | | | | | | | | | | | |