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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Konvencionalni viri električne energije | | | | | | | | | | | | | | |
| **Course title:** | | | Conventional Energy Sources | | | | | | | | | | | | | | |
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| **Študijski program in stopnja**  **Study programme and level** | | | | | **Študijska smer**  **Study field** | | | | | | | | **Letnik**  **Academic year** | | **Semester**  **Semester** | | |
| Podiplomski magistrski študijski program druge stopnje Elektrotehnika | | | | | Mehatronika, Elektroenergetika | | | | | | | | 1 | | 1 | | |
| 2nd cycle masters study programme in Electrical Engineering | | | | | Mechatronics, Electrical Power Engineering | | | | | | | | 1 | | 1 | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | Obvezni-strokovni / Compulsory professional | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64216 | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| **45** |  | | | **30** | | |  | | | |  | | | **75** | |  | **6** |
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| **Nosilec predmeta / Lecturer:** | | | | | Marko Čepin | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | **Predavanja / Lectures:** | | | | slovenski, v primeru večjega števila tujih študentov tudi angleški/slovenian, and english if foreign students attend | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | slovenski, v primeru večjega števila tujih študentov tudi angleški/slovenian, and english if foreign students attend | | | | | | | | | | | |
| **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):** | | | | | | | |
| Hidroelektrarne  Osnove hidrodinamike, strujanje v cevovodih in kanalih, osnove turbinskih strojev, konstrukcijske in obratovalne značilnosti turbin, turbinska regulacija, jezovi in pregrade, hidravlične sheme hidroelektrarn, razdelitev hidroelektrarn glede na akumulacijo, padec in pretok ter način upravljanja.  Termoelektrarne  Osnove termodinamike, procesi zgorevanja in parni kotli, izkoristki tehnoloških procesov, značilnosti parnih in plinskih turbin, problematika izpustov in njihov vpliv na okolje, čistilne naprave za zmanjšanje emisij izpustov iz termoelektrarn.  Jedrske elektrarne  Osnove jedrskih reakcij, povezava mase in energije, pomembne značilnosti najpogostejših tipov jedrskih reaktorjev, obratovanje jedrskih reaktorjev, sistemi jedrskih elektrarn, naravno sevanje in zaščita pred sevanjem, jedrski odpadki, njihovo shranjevanje in njihov vpliv na okolje, varnost jedrskih elektrarn, metode za ocenjevanje tveganja. | | | | | | | |  | | Hydroelectric power plants  Basics of hydrodynamics, water flow in pipes and channels, basics of turbo machines, design and operating characteristics of turbines, turbine control, dams and barriers, hydraulic hydroelectric schemes, types of hydroelectric power plants regarding accumulation, water heights and flow, and mode of operation.  Thermal power stations  Basics of thermodynamics, combustion processes and steam boilers, process efficiency, characteristics of steam and gas turbines, problems of emissions and impact to the environment, systems to reduce emissions of thermal power plants.  Nuclear power plants  Fundamentals of nuclear reactions, relation between mass and energy, characteristics of the most common types of nuclear reactors, operation of reactors, nuclear power plant systems, natural radiation and radiation protection, radioactive waste, their effects to the environment and disposal, nuclear power plants safety, risk assessment methods. | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| 1. B. Orel: Energetski pretvorniki I, Založba FER, Ljubljana 1992 2. B. Orel: Energetski pretvorniki II, Založba FER, Ljubljana 1993 3. R. K. Rajput, Power Plant Engineering, Laxmi Publications, Fourth edition, 2008 4. G. Kessler, Sustainable and Safe Nuclear Fission Energy, Springer 2012 | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Študent bo poznal osnovne mehanizme pretvorbe primarnih energetskih virov v električno energijo s klasičnimi tehnologijami. Znal bo oceniti energetske potenciale primarnih virov energije v smislu proizvodnje električne energije. Poznal bo osnovno zgradbo in funkcijo posameznih komponent konvencionalnih postrojenj za pretvorbo v električno energijo. Seznanil se bo s problematiko in dilemami umeščanja konvencionalnih energetskih objektov v prostor. | |  | | Student will learn basic mechanisms of primary energy conversion to electric energy with classic technologies. Student will be capable to assess energy potentials regarding their conversion technologies into electric energy. Student will learn structure and functions of components and their interactions within conventional power plants. The problems and possible solutions regarding the spatial planning related with electric power systems will be communicated. | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Slušatelj bo razumel načine in metode pretvorbe primarnih energetskih virov v električno energijo v klasičnih elektrarnah. Spoznal bo osnove delovanja in glavne komponente tovrstnih objektov. Znal bo izračunati osnovne parametre učinkovitosti energetskih pretvorb. Spoznal bo osnovne obratovalne značilnosti klasičnih virov električne energije. Sposoben bo sodelovati pri reševanju problemov na področju pretvarjanja električne energije v hidroelektrarnah, v termoelektrarnah in v jedrskih elektrarnah. | | |  | Student will understand methods of conversion of primary energy into electric energy in classical power plants.  Student will learn plants operation and their systems interaction. The learning outcome is going to be an ability to assess efficiency of processes related to energy conversion.  Student will be capable to participate in solving technical questions and problems in the field of conversion to electric power in hydroelectric power plants, thermal power plants and nuclear power plants. | |
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| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Predavanja in laboratorijske vaje. | | |  | Lectures and exercises. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Način: laboratorijske vaje, izpit.  Ocene od 1 do vključno 5 so negativne, ocene od vključno 6 do 10 so pozitivne.  Pozitivna ocena laboratorijskih vaj je pogoj za pristop k izpitu.  Prispevki k oceni:   * laboratorijske vaje * izpit | 50%  50% | | | | Type: laboratory exercises, exam.  Negative grades: from 1 to 5, positive grades: from 6 to 10.  Positive evaluation of laboratory exercises is a prerequisite for the exam.  Contributions to the final grade:   * laboratory exercises * exam |
| **Reference nosilca / Lecturer's references:** | | | | | |
| 1. BRICMAN REJC, Živa, ČEPIN, Marko. Izboljšana metoda za oceno zanesljivosti proizvodnje v elektroenergetskem sistemu. Elektrotehniški vestnik, 2013, letn. 80, št. 1/2, str. 57-63. 2. ČEPIN, Marko, VOLKANOVSKI, Andrija. Nova faktorja pomembnosti v elektroenergetskih sistemih. Elektrotehniški vestnik, 2009, letn. 76, št. 4, str. 177-181. 3. BRICMAN REJC, Živa, ČEPIN, Marko. Estimating the additional operating reserve in power systems with installed renewable energy sources. International journal of electrical power & energy systems, Nov. 2014, vol. 62, str. 654-664. 4. GJORGIEV, Blaže, ČEPIN, Marko, VOLKANOVSKI, Andrija, KANČEV, Duško. Generation scheduling analyses of the Slovenian power system in future. Elektrotehniški vestnik, 2014, letn. 81, št. 1/2, str. 20-26. 5. 5. KANČEV, Duško, GJORGIEV, Blaže, VOLKANOVSKI, Andrija, ČEPIN, Marko. Time-dependent unavailability of equipment in an ageing NPP : sensitivity study of a developed model. *Reliability engineering & systems safety*, 2016, vol. 148, str. 11-20. | | | | | |