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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Matematika II | | | | | | | | | | | | | | |
| **Course title:** | | | Mathematics II | | | | | | | | | | | | | | |
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| **Študijski program in stopnja**  **Study programme and level** | | | | | **Študijska smer**  **Study field** | | | | | | | | **Letnik**  **Academic year** | | **Semester**  **Semester** | | |
| Univerzitetni študijski program prve stopnje Elektrotehnika | | | | | **Ni smeri** | | | | | | | | 1. | | letni | | |
| 1st cycle academic study programme | | | | |  | | | | | | | | **1.** | | **summer** | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | Obvezni – splošni/ compulsory general | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64105 | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| **60** |  | | | **45** | | |  | | | |  | | | **120** | |  | **9** |
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| **Nosilec predmeta / Lecturer:** | | | | | Gregor Dolinar | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | **Predavanja/Lectures:** | | | | slovenski | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | slovenski | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | |  | **Prerequisits:** | | | | | | | |
| Vpis v prvi letnik študija in opravljen izpit pri predmetu Matematika I.  Namesto opravljenega izpita pri predmetu Matematika I zadostujejo tudi opravljeni izpiti, ki pokrivajo naslednje vsebine: številske množice (naravna števila, racionalna števila, realna števila, kompleksna števila), zaporedja (stekališče, limita, omejenost), številske vrste (konvergenca, kriteriji za konvergenco vrste, alternirajoča vrsta), funkcije (definicijsko območje, zaloga vrednosti, sodost in lihost, injektivnost, surjektivnost, bijektivnost, kompozitum, inverzna funkcija, elementarne funkcije, limita, zveznost), odvod funkcije (pravila za odvajanje, geometrijska interpretacija, diferencial, uporaba odvoda), integral funkcije (nedoločeni integral, določeni integral, uporaba integrala). | | | | | | | | |  | Enrolment in the first year of study and completed exam Mathematics I.  The exam Mathematics I can be replaced by exams that cover the following topics: number systems (positive integers, rational numbers, real numbers, complex numbers), sequences (accumulation points, limit, boundedness), series (convergence, convergence tests, harmonic series, alternating series), functions of one real variable (domain of definition, image, oddness and evenness, injectivity, surjectivity, bijectivity, composition, inverse function, elementary functions, continuity, limit), derivative of a function (derivation rules, geometric interpretation, differential, applications), integral of a function (indefinite integral, definite integral, applications of definite integral). | | | | | | | |
| **Vsebina:** | | | | | | | |  | | **Content (Syllabus outline):** | | | | | | | |
| Vektorji (osnovne operacije, skalarni produkt, vektorski produkt, mešani produkt, analitična geometrija). Funkcijske vrste (potenčna vrsta, Taylorjeva vrsta, Fourierjeva vrsta). Funkcije dveh in več spremenljivk (parcialni odvodi, odvod posredne funkcije, ekstrem, vezani ekstrem). Diferencialne enačbe (enačbe prvega reda (ločljive spremenljivke, linearna, eksaktna), linearne enačbe višjih redov (konstantni koeficienti, Eulerjeva), sistemi diferencialnih enačb, linearno neodvisne rešitve). | | | | | | | |  | | Matrices (basic operations, matrix product, rank, determinant, eigenvalues, eigenvectors, linear transformations). Systems of linear equations (Gauss elimination, Cramer's rule).  Vectors (basic operations, scalar product, vector product, scalar triple product, analytic geometry). Function series (power series, Taylor series, Fourier series). Functions of two and more variables (partial derivatives, chain rule, extrema, conditional extrema). Ordinary differential equations (ODE) of the first order (with separable variables, linear). ODE of higher orders (with constant coefficients, Euler's equation). Linear systems of ODEs, linearly independent solutions. | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| 1. G. Tomšič, N. Mramor Kosta, B. Orel: Matematika II, Založba FE in FRI, 2005.  2. P. Oblak, Matematika, Založba FE in FRI, 2014.  3. E. Kreyszig: Advanced engineering mathematics, John Wiley & Sons, 2006.  4. G. B. Thomas: Thomas' Calculus, Pearson Education, 2005.  5. David C. Lay, Linear algebra and its applications, Pearson, Addison Wesley, 2011.  6. N. Mramor Kosta, B. Jurčič-Zlobec: Zbirka nalog iz Matematike II, Založba FE in FRI, 2005.  7. G. Dolinar: Rešene naloge iz Matematike II za VSŠ, Založba FE in FRI, 2005.  8. Spletna učilnica eFE https://e.fe.uni-lj.si | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Osvojiti in nadgraditi osnovne matematične pojme, postopke in zakonitosti ter poglobiti njihovo razumevanje. Razvoj analitičnega razmišljanja ter skrbnega in natančnega sklepanja. Spoznati programsko orodje za simbolno računanje (npr. Mathematica). | |  | | To present and upgrade basic mathematical concepts, procedures, and laws, and to deepen their understanding. To develop analytical thinking and careful and exact mathematical reasoning. To become familiar with the software for symbolic computations (e.g., Mathematica). | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Poznavanje in razumevanje osnovnih pojmov matematične analize in linearne algebre, vključno z vektorji, matrikami, funkcijami več spremenljivk in diferencialnimi enačbami. Sposobnost analize in matematične interpretacije tehničnih problemov. Sposobnost uporabe programskih orodij pri reševanju teh problemov. | | |  | Knowledge and understanding of the basic concepts of calculus and linear algebra, including vectors, matrices, systems of linear equations, function series, and ordinary differential equations. The ability to analyse and mathematically interpret fundamental technical problems. The ability to use computer software for solving such problems. | |
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| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Predavanja, avditorne vaje, laboratorijske vaje in individualizirane domače naloge. Skupinska analiza, interpretacija in reševanje tehničnih problemov. | | |  | Lectures, tutorials, laboratory tutorials and homework assignments. Collective analysis, interpretation, and solving of technical problems. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Načini:  - domače naloge,  - preverjanje laboratorijskih vaj,  - pisni izpit,  - ustni izpit.  K izpitu lahko pristopijo tisti, ki pravilno rešijo določeno število domačih nalog, pozitivno opravijo preverjanje laboratorijskih vaj in so prisotni na določenem številu avditornih in laboratorijskih vaj.  Ocenjevalna lestvica:  negativno (od 1 do 5),  pozitivno (od 6 do 10).  Pozitivna ocena na pisnem izpitu je pogoj za pristop k ustnemu izpitu. Pozitivna ocena na ustnem izpitu je pogoj za skupno pozitivno oceno.  Kandidat lahko opravi pisni izpit tudi z dvema kolokvijema.  Prispevki k oceni:  - pisni izpit,  - ustni izpit. | 50%  50% | | | | Types:  - homework assignments,  - evaluation of laboratory exercises,  - writing exam,  - oral exam.  Only those who solve a predetermined number of homework assignments, pass the evaluation of laboratory exercises and have a sufficient visit of tutorials and laboratory exercises can attend the exams.  Grading scale:  negative (1-5),  positive (6-10).  Positive grade at the writing exam is a prerequisite for the oral exam. Positive grade at the oral exam is a prerequisite for a positive final grade.  The candidate can also pass the final exam by attending two partial exams.  Contributions to final grade:  - writing exam,  - oral exam. |
| **Reference nosilca / Lecturer's references:** | | | | | |
| 1. DOLINAR, Gregor, KUZMA, Bojan, NAGY, Gergő, SZOKOL, Patrícia. Restricted skew-morphisms on matrix algebras. *Linear Algebra and its Applications*, ISSN 0024-3795, 2016, vol. 490, str. 1-17.  2. DOLINAR, Gregor, GUTERMAN, Aleksandr Èmilevič, MAROVT, Janko. Monotone transformations on B(H) with respect to the left-star and the right-star partial order. *Mathematical inequalities & applications*, ISSN 1331-4343, 2014, vol. 17, no. 2, str. 573-589.  3. DOLINAR, Gregor, GUTERMAN, Aleksandr Èmilevič, KUZMA, Bojan, OBLAK, Polona. Commuting graphs and extremal centralizers. *Ars mathematica contemporanea*, ISSN 1855-3966, 2014, vol. 7, no. 2, str. 453-459.  4. DOLINAR, Gregor, MOLNÁR, Lajos. Automorphisms for the logarithmic product of positive semidefinite operators. Linear and Multilinear Algebra, ISSN 0308-1087, 2013, vol. 61, no. 2, str. 161-169.  5. DOLINAR, Gregor, GUTERMAN, Aleksandr Emilevič, MAROVT, Janko. Automorphisms of K(H) with respect to the star partial order. Operators and matrices, ISSN 1846-3886, 2013, vol. 7, no. 1, str. 225-239. | | | | | |