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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Numerične metode | | | | | | | | | | | | | | |
| **Course title:** | | | Numerical Methods | | | | | | | | | | | | | | |
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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 | | | | | **Vse smeri** | | | | | | | | 3. | | zimski | | |
| 1st cycle academic study programme Electrical Engineering | | | | | **All fields** | | | | | | | | **3.** | | **winter** | | |
|  | | | | | | | | | | | | | | | | | |
| **Vrsta predmeta / Course type** | | | | | | | | | | | | Izbirni- strokovni/ elective professional | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64130 | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| **30** |  | | | **30** | | |  | | | |  | | | **65** | |  | **5** |
|  | | | | | | | | | | | | | | | | | |
| **Nosilec predmeta / Lecturer:** | | | | | Gregor Dolinar, Melita Hajdinjak | | | | | | | | | | | | |
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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 letnik. | | | | | | | | |  | Enrolment in the year of the course. | | | | | | | |
| **Vsebina:** | | | | | | | |  | | **Content (Syllabus outline):** | | | | | | | |
| Reševanje nelinearnih enačb (bisekcija, sekantna metoda, Newtonova metoda). Sistemi linearnih enačb (Gaussova eliminacija, iterativno reševanje, robni problemi, predoločeni in nedoločeni sistemi linearnih enačb). Interpolacija in aproksimacija (polinomska interpolacija, kubični zlepki, metoda najmanjših kvadratov). Numerično integriranje (trapezna metoda, Simpsonova metoda, Rombergova metoda, singularni integrali). Navadne diferencialne enačbe (Eulerjeva metoda, Heunova metoda, strelska metoda). Parcialne diferencialne enačbe (metoda končnih razlik). | | | | | | | |  | | Solving nonlinear equations (bisection method, secant method, Newton method). Systems of linear equations (Gaussian elimination, iterative methods, boundary value problems, overdetermined and underdetermined systems of linear equations). Interpolation and approximation (polynomial interpolation, cubic splines, least squares method). Numerical integration (trapezoidal rule, Simpson rule, Romberg method, singular integrals). Ordinary differential equations (Euler method, Heun method, shooting method). Partial differential equations (finite difference method). | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| 1. B. Plestenjak: Razširjen uvod v numerične metode, DMFA-založništvo, 2015 2. R.Burden, J.D.Faires: Numerical Analysis, 9th ed., Brooks/Cole, Boston 2010 3. Jurcic Zlobec Borut, Perne Andrej: Octave z uvodom v numericne metode, Zalozba FE, 2009 4. B. Orel: Osnove numerične matematike, Založba FE in FRI, Ljubljana, 2004 5. B. Jurčič-Zlobec, A. Berkopec: Matlab z uvodom v numerične metode, Založba FE in FRI, Ljubljana, 2005 6. Spletna učilnica eFE https://e.fe.uni-lj.si | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Spoznati osnovne numerične metode, njihov pomen in uporabo. Razvijati numerično-analitično razmišljanje. Spoznati programski orodji Matlab in Octave. | |  | | Understanding of basic numerical methods, their meaning and usage. Develop numerical-analytical thinking. To get to know programming tools Matlab and Octave. | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Poznavanje in razumevanje osnovnih numeričnih metod reševanja nelinearnih enačb, reševanja sistemov linearnih enačb, interpolacije in aproksimacije, integriranja funkcij ter reševanja navadnih in parcialnih diferencialnih enačb. Sposobnost analize in numerične interpretacije tehničnih problemov ter sposobnost uporabe programskih orodij Matlab in Octave pri reševanju teh problemov. | | |  | The knowledge and understanding of basic numerical methods for solving nonlinear equations, solving systems of linear equations, interpolation and approximation, integration of functions and solving ordinary and partial differential equations. The ability to analyse and numerically interpret technical problems, and to solve those problems using programming tools Matlab and Octave. | |
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| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Predavanja in laboratorijske vaje. Domače naloge v Matlabu ali Octave. | | |  | Lectures and laboratory tutorials. Homework assignements in Matlab or Octave. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Načini:  - domače naloge,  - pisni izpit,  - ustni izpit.  K izpitu lahko pristopijo tisti, ki pravilno rešijo določeno število domačih nalog in so prisotni na določenem številu 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.  Del ustnega izpita je tudi poročilo o laboratorijskih vajah in o domačih nalogah.  Kandidat lahko opravi pisni izpit tudi z dvema kolokvijema.  Prispevki k oceni:  - pisni izpit,  - ustni izpit.  Pisni izpit.  Ustni izpit. | 50%  50% | | | | Types:  - homework assignments,  - writing exam,  - oral exam.  Only those who solve a predetermined number of homework assignments and have a sufficient visit of 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.  Part of the oral exam is also report from the laboratory tutorials and the homework assignments.  The candidate can also pass the final exam by attending two partial exams.  Contributions to final grade:  - writing exam,  - oral exam.  A final writing exam.  An oral exam. |
| **Reference nosilca / Lecturer's references:** | | | | | |
| **Gregor Dolinar**  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, MOLNÁR, Lajos. Automorphisms for the logarithmic product of positive semidefinite operators. Linear and Multilinear Algebra, ISSN 0308-1087, 2013, vol. 61, no. 2, 161-169.  3. DOLINAR, Gregor, HE, Kan, KUZMA, Bojan, QI, Xiaofei. A note on Jordan derivable linear maps. Operators and matrices, ISSN 1846-3886, 2013, vol. 7, no. 1, str. 159-165.  4. 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.  5. PERUTKOVÁ, Šárka, DANIEL, Matej, RAPPOLT, Michael, PABST, Georg, DOLINAR, Gregor, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. Elastic deformations in hexagonal phases studied by small-angle X-ray diffraction and simulations. PCCP. Physical chemistry chemical physics, ISSN 1463-9076, Feb. 2011, vol. 13, no. 8, str. 3100-3107.  **Melita Hajdinjak**  1. SULIĆ KENK, Vildana, MANDELJC, Rok, KOVAČIČ, Stanislav, KRISTAN, Matej, HAJDINJAK, Melita, PERŠ, Janez. Visual re-identification across large, distributed camera networks. *Image and vision computing*, ISSN 0262-8856, Feb. 2015, vol. 34, str. 11-26.  2. HAJDINJAK, Melita, BAUER, Andrej. Similarity-based relations in Datalog programs. *International journal of uncertainty, fuzziness and knowledge-based systems*, ISSN 0218-4885, Oct. 2012, vol. 20, no. 5, str. 673-700.  3. HAJDINJAK, Melita, BIERMAN, Gavin M. Extending relational algebra with similarities. *Mathematical structures in computer science*, ISSN 0960-1295, Aug. 2012, vol. 22, no. 4, str. 686-718.  4. HAJDINJAK, Melita, BAUER, Andrej. Similarity measures for relational databases. *Informatica*, ISSN 0350-5596, May 2009, vol. 33, no. 2, str. 143-149.  5. HAJDINJAK, Melita, MIHELIČ, France. The PARADISE evaluation framework : issues and findings. *Computational linguistics*, ISSN 0891-2017, Jun. 2006, vol. 32, iss. 2, str. 263-272. | | | | | |