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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Slikovne tehnologije | | | | | | | | | | | | | | |
| **Course title:** | | | Imaging Technologies | | | | | | | | | | | | | | |
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| **Študijski program in stopnja**  **Study programme and level** | | | | | **Študijska smer**  **Study field** | | | | | | | | **Letnik**  **Academic year** | | **Semester**  **Semester** | | |
| doktorski študijski program tretje stopnje Elektrotehnika | | | | | Ni smeri | | | | | | | | **1** | |  | | |
| 3rd cycle: doctoral study programme Electrical Engineering | | | | |  | | | | | | | |  | |  | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | Izbirni / Elective | | | | | |
|  | | | | | | | | | | | |  | | | | | |
| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64851 | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| **30** |  | | |  | | |  | | | |  | | | **95** | |  | **5** |
|  | | | | | | | | | | | | | | | | | |
| **Nosilec predmeta / Lecturer:** | | | | | prof. dr. Boštjan Likar | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | **Predavanja / Lectures:** | | | | **Slovenščina / English** | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | **Slovenščina / English** | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | |  | **Prerequisits:** | | | | | | | |
| Vpis v študijski program. | | | | | | | | |  | Enrolment in the study program. | | | | | | | |
| **Vsebina:** | | | | | | | |  | | **Content (Syllabus outline):** | | | | | | | |
| Tehnike zajemanja digitalnih slik: digitalna fotografija, kamere in svetila za vidni in nevidni del spektra elektromagnetnega valovanja, mikroskopske tehnike, rentgensko slikanje in računalniška tomografija, magnetno resonančno slikanje, ultrazvok, sodobne in prihajajoče slikovne tehnike.  Postopki za samodejno obnovo, kalibracijo, obdelavo in analizo, integracijo, merjenje ter razumevanje slikovne vsebine - s poudarkom na robustnosti, zanesljivosti, stabilnosti in izvedljivosti v realnem času.  Načrtovanje, integracija in uporaba slikovnih tehnologij ter sistemov z računalniškim in strojnim vidom - v vsakdanjem življenju, v industriji in v biomedicini - za pridobivanje večdimenzionalnih informacij o opazovanem prostoru, objektih in subjektih. | | | | | | | |  | | Image acquisition techniques: digital photography, cameras and illumination units for visible and invisible part of the electromagnetic spectrum, microscopy, radiography, computed tomography, magnetic resonance imaging, ultrasonic imaging, advanced and emerging imaging techniques.  Methods for image restoration, calibration, processing, analysis, integration, measuring and understanding of image content - with the emphasis on robustness, reliability, stability and applicability in real-time.  Design, integration and application of imaging technologies and computer and machine vision systems - in everyday life, in industry and in biomedicine - for the extraction of multidimensional information about the inspected space, objects and subjects. | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| [1] Machine Vision: Theory, Algorithms, Practicalities, E. R. Davies, Morgan Kaufmann, 2005.  [2] Handbook of Machine Vision, A. Hornberg, Wiley-VCH, 2006.  [3] Medical Imaging Signals and Systems, J. L. Prince, J. Links, Prentice Hall, 2005.  [4] Digital Image Processing, R. C. Gonzalez, R. E. Woods, Prentice Hall, 2008.  [5] Biomedicinska slikovna informatika in diagnostika, B. Likar, Založba FE in FRI, 2008. | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Spoznati načine pridobivanja digitalnih slikovnih podatkov ter postopke za njihovo upravljanje, obdelavo in uporabo na različnih področjih v vsakdanjem življenju, v industriji in v biomedicini. | |  | | To introduce digital image acquisition techniques and methods for image management and image processing for various applications in everyday life, in industry and in biomedicine. | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Razumevanje fizikalnega ozadja slikanja, tehnologij in naprav za pridobivanje slik, postopkov za izboljševanje kakovosti slik, možnosti za samodejno analizo slik ter uporabo slikovnih sistemov in tehnologij. | | |  | The understanding of imaging physical backgrounds, technologies and devices for image acquisition, expertise in image restoration and image analysis, and applicable knowledge on imaging systems and technologies. | |
|  |
| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Poučevanje poteka v obliki predavanj, kjer se obravnavajo teoretični postopki, najbolj uveljavljene tehnologije in praktični primeri. | | |  | Teaching is conducted in the form of lectures, which address theoretical methods, the most common technologies and practical examples. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Študent pripravi projekt oz. seminar, ki ga predstavi in zagovarja pred ostalimi študenti. Ocena se oblikuje na podlagi vsebine projekta oz. seminarja ter glede na razumevanje vsebine predmeta. | **100** | | | | A student prepares a project or seminar, which is publicly presented and defended. The mark depends on the quality of the project or seminar and the understanding of the course content. |
| **Reference nosilca / Lecturer's references:** | | | | | |
| Bulat Ibragimov, Boštjan Likar, Franjo Pernuš, Tomaž Vrtovec  Shape representation for efficient landmark-based segmentation in 3D  IEEE Transactions on Medical Imaging, 2014  Jaka Katrašnik, Franjo Pernuš, Boštjan Likar  A method for characterizing illumination systems for hyperspectral imaging  Optics Express, 21(4):4841-4853, 2013  Miha Možina, Dejan Tomaževič, Franjo Pernuš, Boštjan Likar  Automated visual inspection of imprint quality of pharmaceutical tablets  Machine Vision and Applications, 24(1):66-73, 2013  Primož Markelj, Dejan Tomaževič, Boštjan Likar, Franjo Pernuš  A review of 3D/2D registration methods for image-guided interventions  Medical Image Analysis, 16(3):642-661, 2012  Žiga Špiclin, Boštjan Likar, Franjo Pernuš  Groupwise registration of multi-modal images by an efficient joint entropy minimization scheme  IEEE Transactions on Image Processing, 21(5):2546-2558, 2012 | | | | | |