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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | | Modul I: Govorne tehnologije | | | | | | | | | | | | | | | | |
| **Course title:** | | | | Module I: Speech Technologies | | | | | | | | | | | | | | | | |
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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 | | | | | | Avtomatika in informatika | | | | | | | | | | 2 | | 1 | | |
| 2nd cycle masters study programme in Electrical Engineering | | | | | | Control systems and computer engineering | | | | | | | | | | 2 | | 1 | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | | | | Izbirni-strokovni /elective professional | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | | | | 64277 | | | | | |
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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 |
|  | | | | | | | | | | | | | | | | | | | | |
| **Nosilec predmeta / Lecturer:** | | | | | | France Mihelič | | | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | | **Predavanja / Lectures:** | | | | slovenski / Slovenian | | | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | slovenski / Slovenian | | | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | | |  | | **Prerequisits:** | | | | | | | | |
| Vpis v letnik predmeta | | | | | | | | | |  | | Enrolment in the year of the course | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | | |  | | **Prerequisits:** | | | | | | | | |
| * Zaključen dodiplomski študij na področju elektrotehnike ali sorodnih tehniških oziroma naravoslovno-matematičnih ved. * Vpis v 2. letnik podiplomskega študijskega programa II. stopnje Elektrotehnika. | | | | | | | | | |  | | * Completed undergraduate study programme in the field of electrical engineering or related engineering or natural and mathematical sciences. * Enrolment in the 2nd year of the Master’s study programme of Electrical engineering (2nd cycle). | | | | | | | | |
| **Vsebina:** | | | | | | | | |  | | | **Content (Syllabus outline):** | | | | | | | | |
| Uvod: opis področja, kratek zgodovinski oris razvoja govornih tehnologij, pomen raziskav in pridobivanja znanj na tem področju za slovenski jezik.  Osnovne karakteristike produkcije in zaznavanja govora pri govorni komunikaciji med ljudmi. Predstavitve govornih signalov.  Računalniška obdelava govornega signala: predobdelava, značilke govornega signala, razčlenjevanje govornega signala, govorne podatkovne zbirke.  Sistemi za razpoznavanje govora: verifikacija in identifikacija govorca, razpoznavanje ločeno in vezano izgovorjenih besed ter spontanega govora. Statistično modeliranje akustične in jezikovne predstavitve govora ter njegova pomenska analiza.  Umetni govor: zgradba sistemov za umetni govora, grafemsko fonemska pretvorba, modeliranje prozodije, načini tvorjenja umetnega govornega signala. Vrednotenje sistemov za sintezo govora.  Sistemi, ki omogočajo dialog z računalnikom: zgradba sistemov, upravljanje dialoga, predstavitev znanja, večmodalnost v sistemih za dialog, vrednotenje sistemov za dialog. | | | | | | | | |  | | | Introduction: description of the field, short outline of the historical development of speech technologies. Importance and developments of speech technologies applications for Slovenian language.  Basic characteristics production and auditory perception in human speech communication. Representation of speech patterns.  Speech processing: acquisition and preprocessing, speech features, speech signal segmentation, speech databases.  Speech recognition systems: speaker recognition and verification, isolated word and continuous speech recognition, spontaneous speech recognition. Statistical acoustic and language modeling, semantic speech analysis.  Artificial speech: systems for speech synthesis in general, grapheme-to-phoneme conversion, prosody modeling, speech-synthesis procedures. Assessment of speech synthesis systems.  Dialogue: automated dialogue systems in general, system configurations, dialogue management, knowledge representations, multimodality, assessment of dialogue systems | | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| 1. Mihelič F., Signali, Založba FE in FRI, Ljubljana, 2014 2. Pavešić N., Razpoznavanje vzorcev: uvod v analizo in razumevanje vidnih in slušnih vzorcev, 3. Popravljena in dopolnjena izdaja, Založba FE in FRI, Ljubljana, 2012 3. Rabiner L., Schafer R., Theory and Applications of Digital Speech Processing, Prentince Hall, 1. Ed., 2010 | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| Seznanjanje s področjem govornih tehnologij, spoznavanje samodejnih postopkov za izvajanje različnih nalog s tega področja. | |  | | The aim of this course is to acquaint students with the field of speech technologies and introduce various algorithms, techniques, and methods to accomplish tasks related to this field. | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| Znanje o načinu opisov, predstavitev in umetnem tvorjenju ter razpoznavanju govornih signalov. Razumevanje kompleksnosti in interdisciplinarnosti področja. Znanje in razumevanje o zgradbi, načinu delovanja in zmogljivosti sistemov govornih tehnologij. | | |  | Knowledge about the representation, description, synthesis and recognition of speech signals. Understanding the complexity and interdisciplinarity of the field of speech technologies. Knowledge and understanding of the structure and capabilities of speech- and image-based technologies | |
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| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| * Predavanja, * Sodelovalno učenje, * laboratorijske vaje, * Seminarska naloga | | |  | * Lectures * Interactive teaching * Practical assignements * Seminar work | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Način: laboratorijske vaje, seminarsko delo, ustni izpit.  Ocene od 1 do vključno 5 so negativne, ocene od vključno 6 do 10 so pozitivne.   * Prispevki k oceni: * Seminarskega delo * Ustni izpita * laboratorijskih vajah. | 50%  30%  20% | | | | Type: laboratory exercises, seminar work, oral exam.  Negative grades: from 1 to 5, positive grades: from 6 to 10.  Contributions to final grade:   * Seminar work * An oral exam, and * Practical assignements |
| **Reference nosilca / Lecturer's references:** | | | | | |
| 1. GAJŠEK, Rok, MIHELIČ, France, DOBRIŠEK, Simon. Speaker state recognition using an HMM-based feature extraction method. Computer speech & language, ISSN 0885-2308, Jan. 2013, vol. 27, no. 1, str. 135-150. 2. VESNICER, Boštjan, ŽGANEC GROS, Jerneja, MIHELIČ, France. Fusion of discriminative and generative scoring criteria in GMM-based speaker verification. V: HABERNAL, Ivan (ur.), MATOUŠEK, Václav (ur.). Text, speech and dialogue : proceedings, (Lecture notes in computer science, ISSN 0302-9743, Lecture notes in artifical intelligence, 6836). Berlin; Heidelberg: Springer, cop. 2011, str. 139-146. 3. PAVEŠIĆ, Nikola, ŽGANEC GROS, Jerneja, DOBRIŠEK, Simon, MIHELIČ, France. Homer II - man - machine interface to internet for blind and visually impaired people. Computer communications, ISSN 0140-3664. [Print ed.], 2003, vol. 26, str. 438-443. 4. DOBRIŠEK, Simon, ŽIBERT, Janez, PAVEŠIĆ, Nikola, MIHELIČ, France. An edit-distance model for the approximate matching of timed strings. IEEE transactions on pattern analysis and machine intelligence, ISSN 0162-8828. [Print ed.], Apr. 2009, vol. 31, no. 4, str. 736-741. 5. MIHELIČ, France. Samodejna obdelava slovenskega govora. *Inženir*, ISSN 1855-0290, 2010, vol. 3, št. 2, str. 54-61. | | | | | |