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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** | | | | | | | | | | | | | | | | | |
| **Predmet:** | | | Inteligentno vodenje v sodobnih sistemih | | | | | | | | | | | | | | |
| **Course title:** | | | Advanced intelligent control systems | | | | | | | | | | | | | | |
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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 | | | | |  | | | | | | | | **1** | |  | | |
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| **Vrsta predmeta / Course type** | | | | | | | | | | | | Izbirni /Elective | | | | | |
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| **Univerzitetna koda predmeta / University course code:** | | | | | | | | | | | | 64840 | | | | | |
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| **Predavanja**  **Lectures** | **Seminar**  **Seminar** | | | **Vaje**  **Tutorial** | | | **Klinične vaje**  **work** | | | | **Druge oblike študija** | | | **Samost. delo**  **Individ. work** | |  | **ECTS** |
| **30** |  | | |  | | |  | | | |  | | | **95** | |  | **5** |
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| **Nosilec predmeta / Lecturer:** | | | | | Prof. d. Igor Škrjanc | | | | | | | | | | | | |
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| **Jeziki /**  **Languages:** | | **Predavanja / Lectures:** | | | | **Slovenski/slovene (**v primeru večjega števila tujih študentov angleški**)** | | | | | | | | | | | |
| **Vaje / Tutorial:** | | | | **Slovenski/slovene (**v primeru večjega števila tujih študentov angleški**)** | | | | | | | | | | | |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | | | | | | | | |  | **Prerequisits:** | | | | | | | |
| Vpis v doktorski študij  Predhodna izobrazba priporočljivo naravoslovno tehniške usmeritve. | | | | | | | | |  | Enrolment in the program  Finished programme recommended from natural scientist field. | | | | | | | |
| **Vsebina:** | | | | | | | |  | | **Content (Syllabus outline):** | | | | | | | |
| Uvod v inteligentne sisteme. Osnovni principi mehkih in nevronskih sistemov v vodenju. Osnovni principi adaptivnih sistemov: direktni in indirektni adaptivni sistemi, samonastavljivi regulatorji, razporejanje parametrov in ojačenja. Pregled principov in metod prediktivnega vodenja. Prediktivno vodenje na osnovi mehkih modelov. Adaptivno vodenje na osnovi mehkih modelov. Primeri inteligentnega vodenja v sodobnih sistemih visokih tehnologij: v kemijski, farmacevtski, biokemijski in v primeru avtonomnih sistemov. | | | | | | | |  | | Introduction to intelligent systems. Basic principles of fuzzy and neural systems in control. Basic principles of adaptive systems: direct and indirect approaches, self-tuning controllers, gain-scheduling controlles. Basic principles and methods of predictive control. Fuzzy model based predictive and adaptive control. Examples of intelligent control in advanced technological processes. | | | | | | | |

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| **Temeljni literatura in viri / Readings:** | | | | | |
| Nelles O (2000) Nonlinear System Identification, Springer.  Karer G, Škrjanc I (2013) Predictive Approaches in Control of Complex Systems, Springer.  Škrjanc I (2014) Inteligentne metode v identifikaciji sistemov, skripta v pripravi. | | | | | |
| **Cilji in kompetence:** | |  | | **Objectives and competences:** | |
| * predstaviti problematiko inteligentnega vodenja * predstaviti metode prediktivnega in adaptivnega vodenja * predstaviti problematiko uporabe naprednih metod vodenja v sodobnih sistemih * predstaviti orodja za načrtovanje naprednih metod vodenja | |  | | * to present the problems of intelligent control systems * to present the methods of predictive and adaptive control * to present the implementation problems of advanced control systems * to present the tools for design of advanced control systems | |
| **Predvideni študijski rezultati:** | | |  | **Intended learning outcomes:** | |
| * osnovna znanja s področja inteligentnih sistemov v vodenju * napredni pristopi pri vodenju sodobnih sistemov * uporaba osvojenih znanj pri projektnem delu | | |  | * basic knowledge from intelligent control systems * advanced approaches in modern control systems * use of obtained knowledge at project work | |
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| **Metode poučevanja in učenja:** | | |  | **Learning and teaching methods:** | |
| Predavanja, mentorsko delo in seminar. | | |  | Lectures, tutorials, seminar. | |
| **Načini ocenjevanja:** | Delež (v %) /  Weight (in %) | | | | **Assessment:** |
| Projekt | **100** | | | | Project |
| **Reference nosilca / Lecturer's references:** | | | | | |
| Nunez A, Schutter B de, Saez D, Škrjanc I (2014) Hybrid-fuzzy modeling and identification. *Applied soft computing* 17: 67-77.  Škrjanc I (2011) Fuzzy confidence interval for pH titration curve. *Applied mathematical modelling* 35: 4083-4090.  Hartmann B, Baenfer O, Nelles O, Sodja A, Teslić L, Škrjanc I (2011) Supervised hierarchical clustering in fuzzy model identification. *IEEE transactions on fuzzy systems* 19, 6: 1163-1176.  Dovžan D, Škrjanc I (2010) Predictive functional control based on an adaptive fuzzy model of a hybrid semi-batch reactor. *Control engineering practice* 18, 8: 979-989.  Škrjanc I (2009) Confidence interval of fuzzy models: an example using a waste-water treatment plant. *Chemometrics and Intelligent Laboratory Systems* 96, 2: 182-187. | | | | | |