UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Inteligentni sistemi in agenti
Course title:	Intelligent Systems and Agents

Študijski program in stopnja Study programme and level	Modul Module	Letnik Academic year	Semester Semester
Informacijske in komunikacijske tehnologije, 3. stopnja	Inteligentni sistemi in robotika	1	1
Information and Communication Technologies, 3rd cycle	Intelligent Systems and Robotics	1	1

Vrsta predmeta / Course type   Izbirni / Elective

Univerzitetna koda predmeta / University course code: IKT3-631

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Druge oblike	Samost. delo Individ. work	ECTS
30	30			30	210	10

Navedena porazdelitev ur velja, če je vpisanih vsaj 15 študentov. Drugače se obseg izvedbe kontaktnih ur sorazmerno zmanjša in prenese v samostojno delo. / This distribution of hours is valid if at least 15 students are enrolled. Otherwise the contact hours are linearly reduced and transfered to individual work.

Nosilec predmeta / Lecturer: Prof. dr. Matjaž Gams

Jeziki / **Languages:**	**Predavanja / Lectures:**	Slovenščina, angleščina / Slovenian, English
	Vaje / Tutorial:	

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Zaključen študij druge stopnje s področja informacijskih ali komunikacijskih tehnologij ali zaključen študij druge stopnje na drugih področjih z znanjem osnov s področja predmeta. Potrebna so tudi osnovna znanja matematike, računalništva in informatike.

Prerequisites:

Completed second cycle studies in information or communication technologies or completed second cycle studies in other fields with knowledge of fundamentals in the field of this course. Basic knowledge of mathematics, computer science and informatics is also requested.

Vsebina:

Znanstvena metoda:
   Strukture znanstvenega védenja, znanstvene aktivnosti in procesi
Uvod:
   Motivacija, cilji, koristnost inteligence. Definicije naravne, inženirske, umetne inteligence. Študije inteligence. Višje stopnje razumevanja.
Informacijska družba:
   Definicija informacijske družbe. Trendi informacijske družbe, lastnosti, primeri uporabe. Dileme v sedanji in prihodnji družbi.

Content (Syllabus outline):

Scientific Method:
   scientific knowledge structures, scientific activities/processes
Introduction:
   Motivation, goals, usefulness of intelligence. Definitions of natural, engineering, artificial intelligence. Studies of intelligence. Higher levels of understanding.
Information society:
   Definition of information society. Trends of information society, properties, practical

Inteligentne storitve in sistemi v informacijski družbi.

Umetna inteligenca:
Pregled umetne inteligence (po knjigi avtorjev Russel in Norvig).

Inteligentni sistemi:
Osnove inteligentnih sistemov. Inteligentni sistemi v poslovanju, tehniki, znanosti. Metode in tehnike inteligentnih sistemov. Primeri odmevnih aplikacij. Pregled sorodnih predmetov po svetu.

Inteligentni agenti:
Agenti kot osnovni gradniki umetne inteligence. Tipi agentov. Hierarhija agentov. Platforme in jeziki. Repozitoriji agentov. Agenti e-poslovanja. Pomembne aplikacije agentov. Pregled sorodnih predavanj.

Ambientalna inteligenca:
Definicija ambientalne inteligence. Uporaba inteligentnih sistemov in agentov. Metode za reševanje pomembnejših nalog ambientalne inteligence. Primeri aplikacij in večjih sistemov.

Superinteligenca in princip mnogoterega znanja:
Definicije. Indikatorji. Posledice. Primeri snovanja sistemov.

Izzivi pri uvajanju inteligentnih sistemov in agentov:
Specifike pri uvajanju inteligentnih sistemov in agentov. Prednosti in slabosti v primerjavi s klasičnimi pristopi.

examples of use. Dilemmas in the current and future society. Intelligent services and systems in information society.

Artificial intelligence:
Short overview of AI (based on the book by Russel and Norvig).

Intelligent systems:
Principles and motivations of intelligent systems. Intelligent systems in business, engineering, science. Methods and techniques of intelligent systems. Examples of killer applications. Overview or relevant courses at best institutions

Intelligent agents:
Agents as basic ingredients of artificial intelligence. Types of agents. Hierarchy of agents. Platforms and languages. Agent repositories. E-business agents. Overview of world-wide lectures.

Ambient intelligence:
Definition of ambient intelligence. Use of intelligent systems and agents. Approaches to major tasks in ambient intelligence. Examples of applications and systems.

Superintelligence and the principle of multiple knowledge:
Definitions. Indicators. Consequences. Examples of applications.

Challenges when introducing intelligent systems and agents:
Specifics of intelligent systems and agents. Advantages and weaknesses compared to classical approaches.

Temeljna literatura in viri / Readings:

Knjige / books:
- S. Russel, and P. Norvig. *Artificial Intelligence: A Modern Approach,* 3rd Edition. Pearson Education Limited, 2014. ISBN 978-0136042594
- A.A. Hopgood. *Intelligent Systems for Engineers and Scientists*, 3rd Edition. Taylor and Francis, 2011. ISBN 978-0300097603
- R. Sharda, D. Delen, and E. Turban. *Business Intelligence and Analytics: Systems for Decision Support,* 10th Edition. Prentice Hall, 2014. ISBN 978-0133050905
- N. Bostrom. *Superintelligence: Paths, Dangers, Strategies*, Oxford University Press, 2016. ISBN 978-0198739838
- G. Weiss. *Multiagent Systems (Intelligent Robotics and Autonomous Agents series)*. MIT, 2013. ISBN 978-0262018890

Cilji in kompetence:

Cilj predmeta je podati splošno in napredno znanje o inteligentnih sistemih in inteligentnih agentih v povezavi z umetno inteligenco, ambientalno

Objectives and competences:

The goal of the course is to provide general and advanced knowledge of intelligent systems and intelligent agents in relation to artificial intelligence,

inteligenco in informacijsko družbo. Uvodoma so predstavljeni osnovni koncepti omenjenih področij, cilji, motivacija, smisel, nameni in problemi pri uveljavljanju omenjenih metod.	ambient intelligence and information society. In the introduction, basic concepts, goals, motivations and objectives are presented.
Študenti, ki bodo uspešno končali ta predmet, bodo obvladali osnove inteligentnih sistemov in agentov in bodo usposobljeni za njihovo uporabo v reševanju zahtevnih problemov in vrednotenje njihovih rezultatov.	The students who will successfully complete this course will master the basics of intelligent systems and agents and will be capable of applying these systems in solving demanding problems and evaluating their results.

Predvideni študijski rezultati:

Intended learning outcomes:

Študenti bodo z uspešno opravljenimi obveznostmi tega predmeta pridobili:	Students successfully completing this course will acquire:
- osnove znanstvenega pristopa in konceptov v umetni inteligenci, agentih in inteligentnih sistemih - osnovna in napredna znanja umetne inteligence, agentov in inteligentnih sistemov - pregled obstoječih nalog in metod - obvladovanje tehničnih in praktičnih vidikov metod umetne inteligence in inteligentnih sistemov in agentov - sposobnost uporabe obstoječih metod strojnega učenja in rudarjenja podatkov na novih problemih - sposobnost ugotavljanja uspešnosti metod umetne inteligence, inteligentnih sistemov in agentov pri uporabi na konkretni nalogi	- Basic scientific approach and concepts in artificial intelligence, agents and intelligent systems - Basic and advanced knowledge about AI and intelligent systems and agents - Overview of existing tasks and methods - Mastering technical and practical aspects of AI, intelligent systems and agents - The ability to apply existing ML and DM methods to new problems - The ability to identify whether ML or DM methods are successful when used on a given domain

Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja, seminar, konzultacije, individualno delo	Lectures, seminar, consultancy, individual work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Seminarska naloga	80 %	Seminar work
Ustni zagovor	20 %	Oral defense

Reference nosilca / Lecturer's references:

- A. Tavčar, D. Kužnar, and **M. Gams**, "Hybrid multi-agent strategy discovering algorithm for human behavior". *Expert systems with applications*, ISSN 0957-4174, vol. 71, pp. 370-382, 2017.
- M. Gjoreski, H. Gjoreski, M. Luštrek, and **M. Gams**. "How accurately can your wrist device recognize daily activities and detect falls?". *Sensors*, ISSN 1424-8220, vol. 16, no. 6, pp. 800-1-800-21, 2016.
- H. Gjoreski, B. Kaluža, **M. Gams**, R. Milić, and M. Luštrek. "Context-based ensemble method for human energy expenditure estimation." *Applied soft computing*, ISSN 1568-4946, vol. 37, pp. 960-970, 2015.
- H. Gjoreski, S. Kozina, **M. Gams**, M. Luštrek, J.A. Álvarez-García, J.H. Hong, J. Ramos, A.K. Dey, M. Bocca, and N. Patwari. "Competitive live evaluations of activity-recognition systems." *IEEE pervasive computing*, vol. 14, no. 1, pp. 70-77, 2015.
- V. Vidulin, M. Bohanec, and **M. Gams**. "Combining human analysis and machine data mining to obtain credible data relations." *Information sciences*, vol. 288, pp. 254-278, 2014.