UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)			
Predmet:	Osnove umetne inteligence		
Course title:	Introduction to artificial intelligence		

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Interdisciplinarni univerzitetni študijski program Računalništvo in matematika	ni smeri	3	prvi
Interdisciplinary first cycle academic study programme Computer Science and Mathematics	none	3	first

Vrsta predmeta / Course type	obvezni / compulsory

Univerzitetna koda predmeta / University course code:	63214

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work		ECTS
45		30			105		6

Nosilec predmeta / Lecturer:	prof. dr. Ivan Bratko

Jeziki / **Languages:**	**Predavanja /** **Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v letnik študija.	Enrolment in the programme.

Vsebina:	**Content (Syllabus outline):**

Uvod v umetno inteligenco in primeri uporabe	Introduction to Artificial Intelligence, examples of applications
Prostor stanj in osnovni algoritmi preiskovanja: globinsko, širinsko, iterativno poglabljanje, zahtevnost teh algoritmov	State space and basic search algorithms: depth-first, breadth-first and iterative deepening, complexity of these algorithms
Hevristično preiskovanje, algoritma A* in IDA*, izrek o popolnosti A*, lastnosti ocenitvenih funkcij ter analiza časovne in prostorske zahtevnosti	Heuristic search, algorithms A* and IDA*, admissibility theorem for A*, properties of heuristic function and analysis of time and space complexity
Dekompozicija problemov z AND/OR grafi, algoritmi iskanja v AND/OR grafih, hevristično preiskovanje in algoritem AO*	Problem decomposition with AND/OR graphs, search in AND/OR graphs, heuristic search algorithm AO*
Strojno učenje: problem učenja iz podatkov, iskanje zakonitosti v podatkih in podatkovno rudarjenje, opisni jeziki in prostori hipotez, učenje odločitvenih dreves, regresijskih dreves, modelnih dreves, ter pravil. Programska orodja strojnega učenja in primeri uporabe.	Machine learning: problem of learning from data, data mining, description languages and hypothesis spaces, induction of decision trees, regression trees, model trees, and rules. Software tools for machine learning and applications.
Predstavitev znanja in ekspertni sistemi: predstavitev znanja s pravili, ogrodji, semantičnimi mrežami, ontologije, algoritmi sklepanja in generiranje razlage, obravnavanje negotovega znanja, bayesovske mreže	Knowledge representation and expert systems: knowledge representation with rules, frames, semantic networks, ontologies, inference algorithms and generationg explanation, handling uncertain knowledge, Bayesian networks
Planiranje po principu sredstev in ciljev, planiranje s popolno in delno urejenostjo, regresiranje ciljev, primeri uporabe v robotiki in logistiki	Means-ends planning, total-order and partial-order planning, goal regression, applications in robotics and logistics

Temeljni literatura in viri / Readings:

I. Bratko, Prolog Programming for Artificial Intelligence, 4th edition, Pearson Education,

Addison-Wesley 2011, ISBN: 0201403757.

S. Russell, P. Norvig, Artificial Intelligence: A Modern Approach, Third edition, Pearson

Education, Prentice-Hall 2010, ISBN: 0136042597.

I. Bratko, Prolog in umetna inteligenca, Založba FE in FRI, ponatis 2011.

I. Kononenko, Strojno učenje, Založba FE in FRI, 2005.

Materiali na spletu (Spletna učilnica FRI, Ivan Bratko home page):   Prosojnice predavanj, naloge.

Cilji in kompetence:

Seznaniti slušatelje z osnovnimi koncepti, idejami, metodami in tehnikami umetne inteligence

Sposobnost reševanja problemov z metodami umetne inteligence

Zmožnost razumevanja literatura s področja umetne inteligence

Prispevati k razumevanju relevantnosti tehničnih dosežkov umetne inteligence glede na njihove implikacije v filozofiji in psihologiji

Objectives and competences:

Teach basic concepts, ideas, methods and techniques of artificial intelligence (AI)

Ability to solve problems with methods of artificial intelligence

Ability to understand the literature in the area of AI

Contribute to the understanding of the relevance of technical achievements of AI with respect to their implications in philosophy and psychology

Predvideni študijski rezultati:

Znanje in razumevanje:

Poznavanje glavnih omrežnih modelov (TCP/IP in ISO/OSI). Razumevanje razlike med arhitekturo in strukturo. Poznavanje in ločevanje funkcionalnosti posamezne plasti. Sposobnost umestitve konkretnega problema na ustrezno plast v modelu.

Uporaba:

Uporaba omrežnih protokolov in storitev v svojih izvedbah.

Intended learning outcomes:

Knowledge and understanding:

The student recognises and understands the most frequently applied techniques of AI

Application:

The students is capable of applying methods of AI in the planning and development of concrete computer applications in various application areas

Reflection:

Refleksija: Spoznavanje in razumevanje medsebojne soodvisnosti plasti v različnih večplastnih modelih omrežij in povezava s konkretnimi izvedbami. Prenosljive spretnosti - niso vezane le na en predmet: Reševanje različnih problemov na osnovi večplastnih arhitekturnih modelov storitev. Reševanje različnih problemov na osnovi različnih strukturnih modelov omrežij in topologij.	The student is capable of judging the implications of technical achievements of AI regarding the possibilities and limitations in computer applications, the limits of computer intelligence, similarities and differences with human intelligence, and some questions of cognitive science. Transferable skills: Skills are not limited to one subject, the student is capable of applying the learned methods in the development of computer applications and systems in general.

Metode poučevanja in učenja: / **Learning and teaching methods:**

Predavanja, laboratorijske vaje, domače naloge, individualni ali skupinski projekti	Lectures, laboratory exercises, homework, individual and team projects

Načini ocenjevanja: / Delež (v %) / Weight (in %) / **Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
Sprotno preverjanje (domače naloge, kolokviji in projektno delo)	50%	Continuing (homework, midterm exams, laboratory exercises)
Končno preverjanje (pisni in ustni izpit)	50%	Final (written or oral exam)
Ocene: 6-10 pozitivno, 1-5 negativno		Grading: 6-10 pass, 1-5 fail.
(v skladu s Statutom UL)		

Reference nosilca / Lecturer's references:

BRATKO, Ivan. Prolog programming for artificial intelligence. 4th ed. Harlow (England) [etc.]: Addison-Wesley: Pearson, cop. 2012. XXI, 673 str., ilustr. ISBN 978-0-321-41746-6. ISBN 0-321-

41746-1. [COBISS.SI-ID 8577364]

MOŽINA, Martin, ŽABKAR, Jure, BRATKO, Ivan. Argument based machine learning. Artificial intelligence, ISSN 0004-3702. [Print ed.], 2007, vol. 171, no. 10/15, str. 922-937. [COBISS.SI-ID 6240084]

LUŠTREK, Mitja, GAMS, Matjaž, BRATKO, Ivan. Is real-valued minimax pathological?. Artificial intelligence, ISSN 0004-3702. [Print ed.], 2006, vol. 170, str. 620-642. [COBISS.SI-ID 19805735]

ŠUC, Dorian, VLADUŠIČ, Daniel, BRATKO, Ivan. Qualitatively faithful quantitative prediction. Artificial intelligence, ISSN 0004-3702. [Print ed.], 2004, vol. 158, no. 2, str. [189]-214, ilustr. [COBISS.SI-ID 4422740]

BRATKO, Ivan, MOZETIČ, Igor, LAVRAČ, Nada. Kardio : a study in deep and qualitative knowledge for expert systems. Cambridge (Mass.), London: The MIT Press, 1989. XIV, 260 str., graf. prikazi. ISBN 0-262-02273-7. [COBISS.SI-ID 19925760]