UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Kognitivne znanosti
Course title:	Cognitive Sciences

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: IKT3-630

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15	15			15	105	5

*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:

Prerequisites:

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.	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:

Content (Syllabus outline):

Znanstvena metoda:
    strukture znanstvenega védenja, znanstvene aktivnosti in procesi
Uvod:
    uvod v kognitivne znanosti kot študij uma in inteligence z interdisciplinarnega stališča
    uvod v um, zavest, čustva, podzavest, kvalia, psihologija drugi pristopi
    povezava med kognitivnimi znanostmi in umetno inteligenco ter inteligentnimi sistemi
	Scientific Method:
	    scientific knowledge structures, scientific activities/processes
	Introduction:
	    introduction to cognitive sciences as studies of the mind and intelligence from the interdisciplinary viewpoint
	    introduction to the mind, consciousness, feelings, subconsciousness, qualia, psychology, other approaches

Kognitivni paradoksi in koncepti:
    Turingov test, TT, TTT, TTTT
    kitajska Searlova soba, Einsteinova knjiga
    princip in paradoks mnogoterega znanja
    lahko in težko vprašanje
    trendi

Kognitivne arhitekture:
    teoretične osnove
    pregled arhitektur
    arhitekture podsistemov kognicije
    celovite arhitekture tipa 1
    arhitekture tipa 2
    nizko in visokonivojske arhitekture

Kognitivne tehnike in metode:
    modeliranje kognicije
    logika, pravila, koncepti, analogije, asociacije, povezave
    kognitivni agenti
    praktična uporaba izbranih tehnik in orodij

Praktično usposabljanje:
    praktična uporaba izbranih tehnik in orodij
    kognitivnih znanosti

relation to artificial intelligence and intelligent systems

Cognitive paradoxes and concepts:
    Turing test, TT, TTT, TTTT
    Chinese Searl's room, Einstein's book
    principle and paradox of multiple knowledge
    easy and hard question
    trends

Cognitive architectures:
    theoretical foundations, overview
    subsystem architectures
    type 1 architectures
    type 2 architectures
    low/ and high/level architectures

Cognitive techniques and methods:
    modeling of cognition
    logic, rules, concepts, analogies, associations, connections
    cognitive agents
    practical use of cognitive techniques and tools

Practical exercises:
    Practical use of selected cognitive techniques and tools

Temeljna literatura in viri / Readings:

Izbrana poglavja iz naslednjih knjig: / Selected chapters from the following books:

- L. Bermudez. *Cognitive Science: An Introduction to the Science of the Mind*, Cambridge University Press, 2014. ISBN 9780521708371
- P. Thagard. *The Cognitive Science of Science: Explanation, Discovery, and Conceptual Change*, MIT, 2014. ISBN 978-0262017282
- M.S. Gazzaniga, and G.R. Mangun. *The Cognitive Neurosciences*, MIT, 2014. ISBN 978-0393913484
- C.P. Sobel, and P. Li. *The Cognitive Sciences: An Interdisciplinary Approach*, SAGE Publications, 2013. ISBN 978-1412997164
- Y. Wang. *Cognitive Informatics for Revealing Human Cognition: Knowledge, Manipulations in Natural Intelligence*, IGI Global, 2012. ISBN 978-1466624764

Cilji in kompetence:

Razviti znanje in sposobnost konkretne vpeljave kognitivnih metod in tehnik v računalniške programe, softverske ali podprte z robotskimi sistemi, je osnovni cilj predmeta.

Seznanitev z osnovnimi pristopi in arhitekturami je tudi pomemben cilj. Osnovna znanja s področja so dodatni cilj.

Pomembno je razumevanje interdisciplinarnih pogledov na vrsto kognitivnih konceptov, od nižjenivojskih do visokonivojskih kognitivnih

Objectives and competences:

The basic goal is to foster knowledge and capability of applying cognitive methods and techniques into computer and robotic systems.

The second goal is to improve knowledge of cognitive approaches and architectures.

One of the course objectives is to improve knowledge of interdisciplinary viewpoints on selected cognitive concepts from lower-level to higher-level systems, architectures and modules.

sistemov, arhitektur in modelov. Tehnike in metode kognitivnih modelov omogočajo poznavanje računalniških metod, še posebej kognitivnih agentov. Študenti bodo obvladali osnove kognitivnih znanosti in bodo usposobljeni za praktično uporabo izbranih orodij, metod, tehnik in arhitektur kognitivnih sistemov.	Various cognitive techniques and methods including cognitive agents enable constructing computer methods simulating cognitive functions. The students will master the basics of cognitive sciences and will be capable of using selected tools, methods, techniques and architectures of cognitive systems.

Predvideni študijski rezultati:

Intended learning outcomes:

Študenti bodo z uspešno opravljenimi obveznostmi tega predmeta pridobili: • osnove znanstvenega pristopa v kognitivnih znanostih • osnovna znanja o kognitivnih znanostih • pregled obstoječih konceptov in metod kognitivnih znanosti • obvladana uporaba izbranih metod in tehnik kognitivnih sistemov • usposobljenost za praktično implementiranje kognitivnih sistemov	Students successfully completing this course will acquire: • Basic scientific approach in cognitive sciences • Basic knowledge about cognitive sciences • Overview of existing contexts and methods in cognitive sciences • Mastering selected methods and techniques of cognitive systems • Capability of practical use of selected cognitive architectures and systems

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:

- **M. Gams**, M. Horvat, M. Ožek, M. Luštrek, and Aa Gradišek. "Integrating artificial and human intelligence into tablet production process." *AAPS PharmSciTech*, vol. 15, no. 6, pp. 1147-1453, 2014.
- V. Mirchevska, M. Luštrek, and **M. Gams**. "Combining domain knowledge and machine learning for robust fall detection." *Expert systems*, vol. 31, no. 2, pp. 163-175, 2014.
- 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.
- E. Dovgan, M. Javorski, T. Tušar, **M. Gams**, and B. Filipič. "Comparing a multiobjective optimization algorithm for discovering driving strategies with humans*." Expert systems with applications*, vol. 40, no. 7, pp. 2687-2695, 2013.
- **M Gams**. "Alan Turing, Turing machines and stronger." Informatica, vol. 37, no. 1, pp. 9-14, 2013.