UČNI NAČRT PREDMETA/COURSE SYLLABUS	
Predmet	**Osnove inteligentnih sistemov**
Course title	**Foundations of Intelligent Systems**

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Poslovna informatika / 1. stopnja	Računalništvo in informatika	2. letnik	4.
Business Informatics / 1st Cycle	Computer and Information Science	2nd year	4th

Vrsta predmeta/Course type	obvezni/obligatory

Univerzitetna koda predmeta/University course code	1_RI_2_UN6

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
30			30		90	6

Nosilec predmeta/Lecturer:	mag. Igor Makovec, pred. (Učni načrt pripravil prof. dr. Matjaž Gams)

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
• Vpis v drugi letnik študijskega programa. • Študent mora pred izpitom pripraviti in predstaviti seminarsko nalogo.	• The prerequisite for inclusion is enrolment in the second year of study. • Students have to successfully prepare and present a seminar paper before the examination.

Vsebina:	**Content (Syllabus outline):**
• *Znanstvena metoda*: Splošno o strukturah znanstvenega védenja, znanstvenih aktivnostih in procesih, znanstvenem razmišljanju in pridobivanju znanja, kritično razmišljanje na podlagi opazljivih, empiričnih in merljivih dokazov. • *Uvod*: Predstavitev motivacije in ciljev študija inteligentnih sistemov, definicije	• *Scientific method*: General introduction to the structures of scientific knowledge, scientific activities and processes, scientific thinking and acquiring knowledge, critical thinking based on observable, empirical and measurable evidence.

- različnih vrst inteligence in primeri, študije o inteligenci, podroben pregled človeške inteligence in njene aplikativnosti na umetne sisteme, pregled in primeri umetnih inteligentnih sistemov.
- *Informacijska družba:* Definicija informacijske družbe kot družbe prihodnosti, lastnosti informacijske družbe, konkretni primeri prednosti informacijske družbe. Ponazoritev trendov v informacijski družbi ter vloga inteligentnih sistemov v njej, kratek zgodovinski pregled.
- *Umetna inteligenca:* Predstavitev umetne inteligence kot podstati inteligentnih sistemov, pregled najpomembnejših področij s predstavitvijo primerov. Področja bodo predstavljena po Russell in Norvig (2016) ter Poole in Mackworth (2017).
- *Inteligentni sistemi:* Predstavitev lastnosti področja, trendov in primerov, predstavitev oblik samostojnih sistemov in celovitih tehnologij (od ekspertnih sistemov do inteligentnih kognitivnih agentov, temelječ na različnih metodah umetne inteligence), ambientalna inteligenca, predstavitev metod, ki se združujejo v inteligentne sisteme.
- *Pregled sorodnih relevantnih področij:* Inteligentni kognitivni agenti (agentno modeliranje, agentni sistemi, lastnosti in taksonomije agentov, ontologije, prednosti in slabosti, primeri), nevronske mreže (pregled), komunikacija človek-stroj in človek-računalnik (različne modalitete komuniciranja, inteligentni vmesniki, profilizacija …), kognitivna znanost (predstavitev študija človekovega uma, kognicije in inteligence, povezane discipline, osnovne paradigme in koncepti, primeri, kognitivne tehnologije).
- *Izzivi pri razvoju inteligentnih sistemov:* Predstavitev poteka razvoja inteligentnih sistemov, način reševanja problemov z inteligentnimi sistemi in razvojne rešitve,

- *Introduction*: Presentation of the motivation and objectives of the study of intelligent systems, definitions of different types of intelligence and examples of research on intelligence, a detailed overview of human intelligence and its application to artificial systems, overview and examples of artificial intelligence systems.
- *Information society*: Definition of the information society as the society of the future, properties of the information society, concrete examples of advantages of the information society. Overview of trends in the fields of the information society and the role of intelligent systems in it, a brief historical overview of the information society.
- *Artificial intelligence:* Presentation of artificial intelligence as a foundation of intelligent systems, overview of the most important areas with examples. The relevant areas of research will be based on Russell and Norvig (2016), and Poole and Mackworth (2017).
- *Intelligent systems:* Presentation of the characteristics of the field, trends and examples, presentation of different partial systems and comprehensive technologies (from expert systems to intelligent cognitive agents, which are based on various methods of artificial intelligence), ambient intelligence, presentation of methods that form intelligent systems.
- *Overview of the relevant areas:* Intelligent cognitive agents (agent-based modeling, agent systems, properties and taxonomies of agents, ontologies, advantages and disadvantages, examples), neural networks (overview), human-machine and human-computer communication (various modes of communication, intelligent interfaces, profiling, etc.), cognitive science (study of the human mind, cognition and intelligence, related disciplines, basic paradigms and concepts, examples, cognitive technologies).

težave pri snovanju inteligentnih sistemov. • *Orodja in rešitve*: Predstavitev, pregled in preizkušanje sodobnih orodij in rešitev, ki so na voljo pri snovanju inteligentnih sistemov in sorodnih področij.	• *Challenges in the design of intelligent systems*: Presentation of the design of intelligent systems, solving problems with intelligent systems and different design solutions, problems in the design of intelligent systems. • *Tools and solutions*: Presentation, review and testing of modern tools and solutions, available for the design of intelligent systems and in related fields.

Temeljna literatura in viri/Readings:

Temeljna literatura/Basic literature
- Poole, D. L. in Mackworth, A. K. (2017). *Artificial intelligence: Foundations of computational agents* (2nd ed.). Cambridge, United Kingdom: Cambridge University Press.
- Russell, S. J. in Norvig, P. (2016). *Artificial Intelligence: A Modern Approach* (3rd ed.). Upper Saddle River: Pearson.

Priporočljiva literatura/Recommended literature
- Bostrom, N. (2016). *Superintelligence*. Oxford: Oxford University Press.
- Hopgood, A. A. (2012). *Intelligent systems for engineers and scientists*. Boca Raton, Fla: CRC.

Cilji in kompetence:	Objectives and competences:
Učna enota prispeva predvsem k razvoju naslednjih splošnih in specifičnih kompetenc: • sposobnost definiranja, razumevanja in ustvarjalnega reševanja strokovnih izzivov na področjih računalništva in informatike, • usposobljenost za permanentno spremljanje in presojo dogajanj na področju računalništva in informatike, • usposobljenost za pridobivanje novih in poglabljanje pridobljenih strokovnih znanj računalništva in informatike, • usposobljenost za uporabo pridobljenih znanj pri samostojnem reševanju strokovnih problemov računalništva in informatike za uspešno vključujejo v delovne procese v gospodarstvu in negospodarstvu, • razvijanje poklicne identitete, profesionalne odgovornosti in etičnosti. • usposobljenost za analizo in načrtovanje sistemov, • poznavanje načinov predstavitve, zapisa in modeliranja informacij, • usposobljenost za analizo in razvoj strojne in programske opreme,	*The learning unit mainly contributes to the development of the following general and specific competences:* • the ability to define, understand and creatively solve professional challenges in the fields of computer science and informatics, • the competence for continuous monitoring and assessment of developments in the field of computer science and informatics, • the competence to acquire new knowledge and deepen the existing knowledge of computer science and informatics, • the ability to use the acquired knowledge in the independent solving of professional problems of computer science and informatics for successful integration into work processes in the industrial and non-industrial sectors, • developing professional identity, professional responsibility and ethics, • competence for system analysis and design,

• poznavanje zmožnosti in omejitev informacijskih tehnologij, • razumevanje in sposobnost umeščanja računalniških in informacijskih znanj na različna področja tehnike in druga strokovno relevantna področja (ekonomija, poslovanje, organizacijske vede itd.).	• knowing how to present, record and model information, • competence for the analysis and development of hardware and software, • knowing the capabilities and limitations of information technologies, • understanding and the ability to place computer science and informatics knowledge in various fields of technology and other professionally relevant fields (economics, business, organizational sciences, etc.).

Predvideni študijski rezultati:	**Intended learning outcomes:**
Študent/študentka:	*Students:*
• pozna osnove znanstvenega pristopa in dejavnosti ter njeno aplikativnost v širšem delovanju tehnoloških področij, pozna osnovne koncepte inteligentnih sistemov, njihovo raznovrstnost, široko aplikativnost in se zaveda, da je njihova podstat umetna inteligenca, • razume, kako umetna inteligenca in inteligentni sistemi spreminjajo našo družbo, koliko področij lahko inteligentni sistemi izboljšajo in na kakšen način, razume osnove inteligence in njene aplikativnosti v umetnih sistemih, razume pomembnost interdisciplinarnosti in skupinskega dela ter sodelovanja za napredek družbe, • razvije sposobnosti konceptualnega razvijanja inteligentnih sistemov in sposobnost za izbiranje metod za različne probleme, ki jih inteligentni sistemi rešujejo, • se usposobi za apliciranje temeljev umetne inteligence in inteligentnih sistemov na konkretnejša področja in domene zanimanja, se usposobi za kritično presojo uporabnosti konceptov iz raziskovanja inteligence v inteligentnih sistemih, se usposobi za etično presojo rabe inteligentnih sistemov, se usposobi za analizo tehnološkega stanja entitete in podajanje predlogov za izboljšanje z vkorporacijo inteligentnih lastnosti, se usposobi za predvidevanje prihodnjih potreb informacijske družbe.	• know the importance of the basics of the scientific approach, the scientific activities and their applications in the wider scope of technology, know the basic concepts of intelligent systems, their diversity, their broad applications and are aware of artificial intelligence as the foundation of intelligent systems, • recognise how important artificial intelligence and intelligent systems are in changing our society, the many areas they can improve, how they improve them, recognise the importance of the basics of intelligence and its applicability in artificial systems, recognise the value of interdisciplinarity, teamwork and cooperation for society's advancement, • develop skills for the conceptual design of intelligent systems and the ability to choose methods for various problems that intelligent systems solve, • gain competence for the application of artificial intelligence and intelligent systems to more specific areas and domains of interest, gain competence for critical assessment of applying concepts from intelligence to intelligent systems, gain competence for an ethical assessment of the intelligent systems use, gain competence for the analysis of the technological state of a given system, gain competence for proposing improvements by using properties of intelligent behavior, gain competence to

	anticipate the future needs of the information society.
Metode poučevanja in učenja:	**Learning and teaching methods:**
• *predavanja* z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov), • *laboratorijske vaje:* refleksija izkušenj, praktično reševanje več tipičnih problemov na računalniku, predstavitev in zagovor programskih rešitev, diskusija, sporočanje povratne informacije.	• *lectures* with active student participation (explanation, discussion, questions, examples, problem solving), • *laboratory work:* reflection on experience, practical solving of several typical problems on a computer, presentation and defence of programming solutions, discussion, feedback.

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

Načini:
   • izpit
   • izdelava, predstavitev in zagovor seminarske naloge
 	
Ocenjevalna lestvica: ECTS.
	60 %
	40 %
		Types:
		   • exam
		   • preparation, presentation and defence of the seminar paper
		
		Grading scheme: ECTS.