Univerza v Mariboru
Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS			
Ime predmeta:	**Metode umetne inteligence**		
Course title:	**Artificial Intelligence Methods**		
Študijski program in stopnja Study programme and cycle	**Študijska smer Study option**	**Letnik Year of study**	**Semester Semester**
Biomedicinska tehnologija/3. stopnja		**2**	**3 ali 4**
Biomedical Technology/3rd Degree			

Vrsta predmeta (obvezni ali izbirni) / Course type (compulsory or elective)	Izbirni Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	**Seminar Seminar**	**Vaje Tutorial**			**Klinične vaje Clinical training**	**Druge oblike študija Other forms of study**	**Samost. delo Individual work**	**ECTS**
15	**30**	**AV**	**LV**	**RV**			**135**	**6**

Nosilec predmeta / Course coordinator:	Izr. prof. dr. Damjan STRNAD

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites for enrolling in the course or for performing study obligations:**

Vsebina (kratek pregled učnega načrta):	**Content (syllabus outline):**
Uvod v umetno inteligenco Predstavitev znanja in sklepanje z logiko Mehka logika in verjetnostno sklepanje Uvod v strojno učenje: vrste strojnega učenja, klasifikacija in regresija, gradnja in vrednotenje modelov Nadzorovano učenje: umetne nevronske mreže Okrepitveno učenje	Introduction to artificial intelligence Knowledge representation and inference in logic Fuzzy logic and probabilistic reasoning Introduction to machine learning: types of machine learning, classification and regression, model building and evaluating Supervised learning: artificial neural networks Reinforcement learning

Temeljni literatura in viri / Reading materials:

- Norvig, P., Russell, S., Artificial Intelligence: A Modern Approach, 4. izdaja, Pearson, 2021
- Aggarwal, C. C., Neural Networks and Deep Learning: A Textbook, 2. izdaja, Springer, 2023
- Sutton, R. S., Barto, A. G., Reinforcement Learning: An Introduction, 2. izdaja, Bradford Books, 2018
- STRNAD, Damjan, KOHEK, Štefan, BENES, Bedrich, KOLMANIČ, Simon, ŽALIK, Borut. A framework for multi-objective optimization of virtual tree pruning based on growth simulation. Expert systems with applications. [Print ed.]. Dec. 2020, vol. 162, str. 1-10. ISSN 0957-4174. Digitalna knjižnica Univerze v Mariboru – DKUM, DOI: 10.1016/j.eswa.2020.113792.

Cilji in kompetence:	Objectives and competences:
Cilj predmeta je seznaniti študente z osnovnimi metodami umetne inteligence in strojnega učenja.	The objective is to acquaint the students with basic methods of artificial intelligence and machine learning.
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • pojasniti način predstavitve znanja in sklepanja s predikatno logiko • opisati metode za sklepanje z negotovim znanjem, njihove prednosti in slabosti • opisati oblike strojnega učenja in primere nalog, ki jih z njim rešujemo • pojasniti delovanje osnovnih klasifikacijskih in regresijskih modelov strojnega učenja • razumeti arhitekturo, učenje in delovanje umetnih nevronskih mrež • opisati princip in osnovne metode okrepitvenega učenja	**Knowledge and understanding:** • explain how to represent knowledge and reason with predicate logic • describe methods for reasoning with uncertain knowledge, their advantages and disadvantages • describe the types of machine learning and tasks solved with it • explain how basic machine learning classification and regression models work • understand the architecture, training and operation of artificial neural networks • describe the principle and basic methods of reinforcement learning
Prenosljive/ključne spretnosti in drugi atributi: • Spretnosti komuniciranja: pisno izražanje in pri seminarju in ustni zagovor. • Uporaba informacijske tehnologije: uporaba programskih orodij za strojno učenje. • Spretnosti računanja: reševanje računskih problemov. • Reševanje problemov: načrtovanje in izvedba seminarske naloge.	**Transferable/key competences and other abilities:** • Communication skills: written expression and seminar and oral defence. • Use of information technology: use of software tools for machine learning. • Numeracy skills: solving computational problems. • Problem solving: planning and carrying out a seminar assignment.
Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja/konzultacije Seminarji (uporaba programskih orodij, seminarsko poročilo) Samostojno delo	Lectures/consultations Seminars (use of program tools, seminar report) Individual work

Načini ocenjevanja:	Delež (v %) / Share (in %)	Assessment methods:
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Method (written or oral exam, coursework, project):
Ustni izpit	**50 %**	Oral exam
Seminarska naloga	**50 %**	Seminar paper

Reference nosilca / Course coordinator's references:

STRNAD, Damjan, ŽLAUS, Danijel, NERAT, Andrej, ŽALIK, Borut. Efficient compressed storage and fast reconstruction of large binary images using chain codes. Multimedia tools and applications. Published: 09 September 2024, 19 str., ilustr. ISSN 1573-7721. DOI: 10.1007/s11042-024-20199-7. [COBISS.SI-ID 207446531], [JCR, SNIP, Scopus]
projekt: The authors acknowledge the financial support from the Slovenian Research and Innovation Agency (research program P2-0041 and research project J2-4458).
kategorija: 1A2 (Z, A1/2); uvrstitev: SCIE, Scopus, MBP (COMPENDEX, INSPEC, METADEX, PUBMED); tip dela še ni verificiran
točke: 24.23, št. avtorjev: 4
STRNAD, Damjan, KOHEK, Štefan, NERAT, Andrej, ŽALIK, Borut. Efficient representation of geometric tree models with level-of-detail using compressed 3D chain code. IEEE transactions on visualization and computer graphics. 1 Nov. 2020, vol. 26, iss. 11, str. 3177-3188. ISSN 1077-2626. DOI: 10.1109/TVCG.2019.2924430. [COBISS.SI-ID 22440214], [JCR, SNIP, WoS do 16. 4. 2023: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.25, Scopus do 2. 5. 2023: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.25]
kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCIE, Scopus, MBP (COMPENDEX, INSPEC, MEDLINE, METADEX, PUBMED); tip dela je verificiral OSICT
točke: 30.6, št. avtorjev: 4

STRNAD, Damjan, HORVAT, Štefan, MONGUS, Domen, IVAJNŠIČ, Danijel, KOHEK, Štefan. Detection and Monitoring of Woody Vegetation Landscape Features Using Periodic Aerial Photography. Remote sensing. 2023, vol. 15, iss. 11, [article no.] 2766, 18 str., ilustr. ISSN 2072-4292. DOI: 10.3390/rs15112766. [COBISS.SI-ID 154247939], [JCR, SNIP, WoS, Scopus]
financer: ARRS, Program, P2-0041, SI; ARRS, Projekt, L7-2633, SI; Slovenian Research Agency and the Slovenian Ministry of Agriculture, Forestry, and Food through research project V4-2018
kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCIE, Scopus, MBP (CAB, COMPENDEX, DOAJ, GEOREF, INSPEC, METADEX, PUBMED); tip dela je verificiral OSICT
točke: 23.57, št. avtorjev: 5