

COURSE DESCRIPTION

General information		
Lead instructor	Assistant Professor Pance Panov Associate Professor Leo Mršić	
Course name	CDS-16: Selected chapters on artificial intelligence	
Study programme	Computer and Data Science, third cycle Doctoral Study Programme	
Course status	Optional	
Year	First or Second	
Number of credits and mode of delivery	ECTS student workload coefficient	10
	Number of hours (L+P+S)	30/-/270

Course description
<i>1.1. Course goals</i>
<p>The module contributes to the following general and subject-specific competences:</p> <p>General competences:</p> <ul style="list-style-type: none"> - Ability to identify a given research problem, analyse it and offer possible solutions. - Ability to create new knowledge, which represents a contribution to science. - Mastery of standard research methods, procedures and processes in diverse scientific fields. - Familiarity with the notion of quality and strive for professional quality through autonomy, (self-) criticism, (self-) reflection and (self-) evaluation. <p>Subject-specific competences:</p> <ul style="list-style-type: none"> - Ability to solve specific research problems questions related to artificial intelligence. - Development of skills in the use of knowledge in the research field of the doctoral dissertation. - Ability to use innovatively and combine different research methods. - Ability to acquire, interpret, select, evaluate and insert new knowledge. - Ability to design and implement original solutions of given scientific problems
<i>1.2. Course enrolment requirements</i>
To join the course the student must have enrolled in the first or second year of the study programme.
<i>1.3. Intended course learning outcomes</i>
<p>Knowledge and Understanding:</p> <p>Student</p>

- gets acquainted with the theoretical and practical aspects of artificial intelligence;
- learns to use some of the most current artificial intelligence software tools.

Transferable / Key Skills and other attributes:

- can transfer knowledge to various professional and scientific fields, where artificial intelligence methods are used.

1.4. Course content

- Introduction and overview of the field: history of artificial intelligence (AI) and machine learning, an overview of methods and applications. Intelligent Agents.
- Problem-solving in AI. Solving Problems by Searching. Search in Complex Environments. Constraint Satisfaction Problems.
- Knowledge, reasoning, and planning. Logical Agents. First-Order Logic. Inference in First-Order Logic Knowledge. Representation Automated Planning
- Uncertain knowledge and reasoning. Quantifying Uncertainty. Probabilistic Reasoning. Probabilistic Reasoning over Time. Probabilistic Programming. Making Simple Decisions. Making Complex Decisions. Multiagent Decision Making
- Machine Learning. Learning Probabilistic Models. Deep Learning. Reinforcement Learning. Learning from data streams
- Deep Learning for Natural Language Processing. Computer Vision.
- Ethics, and Safety of AI.

1.5. Modes of delivery (mark the appropriate boxes with an X)	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent work
	<input type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input checked="" type="checkbox"/> practicals	<input type="checkbox"/> laboratory
	<input type="checkbox"/> remote learning	<input type="checkbox"/> supervision
	<input type="checkbox"/> field work	<input type="checkbox"/> other _____

1.6. Student obligations

1.7. Monitoring student work (mark the appropriate boxes with an X)

Class attendance		Participation in class		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Continuous assessment of knowledge		Student report		Practical work	
Portfolio		Schoolwork		Homework			

1.8. Assessment and evaluation of student work during classes and the final exam

Type (examination, oral, coursework, project):

- Seminar assignment with reports and presentation, 100%

1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
Hastie, T., Tibshirani, R., & Friedman, J. (2016). The Elements of Statistical Learning. (2th edition). New York, Wiley.		

Russell, S., & Norvig, P. (2022). Artificial Intelligence: A Modern Approach (4th edition). Prentice Hall.		
Géron, A. (2023). Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems (3rd Edition). O'Reilly.		
Bifet, A., Gavaldà, R., Holmes, G., & Pfahringer, B. (2023). Machine learning for data streams with practical examples in MOA. The MIT Press		
Aggarwal, C. C. (2021). Artificial Intelligence: A Textbook. Springer Cham.		
<i>1.10. Supplementary readings</i>		
<i>1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		