

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
Predmet:		Podatkovno rudarjenje				
Course title:		Data mining				
Študijski program in stopnja Study programme and level		Študijska smer Study field		Letnik Academic year	Semester Semester	
Podatkovne znanosti, magistrski študijski program druge stopnje		-		Prvi	Prvi	
The second cycle masters study programme Data Sciences		-		First	First	
Vrsta predmeta / Course type				Obvezni / Obligatory		
Univerzitetna koda predmeta / University course code:				2-PZ-MAG-PR-2020-06-30		
Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	-	30	-	-	90	5
Nosilec predmeta / Lecturer:				izr. prof. dr. Biljana Mileva Boshkoska		
Jeziki / Languages:		Predavanja / Lectures:	Slovenski, angleški / Slovene, English			
		Vaje / Tutorial:	Slovenski, angleški / Slovene, English			
Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:				Prerequisites:		
Ni posebnih pogojev za vključitev v delo. Študent/študentka mora pred pristopom k izpitu pripraviti in zagovarjati projekt.				There are no special prerequisites for the inclusion in work. Prior to the exam, the student has to prepare and present project.		
Vsebina:				Content (Syllabus outline):		
<ul style="list-style-type: none"> Podatkovno rudarjenje in druge metode za analizo podatkov; Standardi na področju podatkovnega rudarjenja; Standardiziran proces podatkovnega rudarjenja: CRISP-DM; 				<ul style="list-style-type: none"> Data mining and data analysis methods; Standards in the field of data mining; A standardized process - cross-industry process for data mining: CRISP-DM; The types of problems and tasks addressed by the data mining; 		

<ul style="list-style-type: none"> • Vrste problemov in nalog primernih za reševanje s podatkovnim rudarjenjem; • Pregled najpomembnejših metod za podatkovno rudarjenje: odločitvena in regresijska drevesa, metoda podpornih vektorjev, Bayesovske mreže, nevronske mreže; • Pregled nekaterih najpomembnejših orodij za podatkovno rudarjenje; • Primeri podatkovnega rudarjenja; • Projekt: celovita rešitev praktičnega problema za podatkovno rudarjenje s pomočjo izbranega orodja na realnem problemu. 	<ul style="list-style-type: none"> • Overview of the most important methods for data mining: decision and regression trees, support vector machines, Bayesian networks, neural networks. • An overview of some of the important tools for data mining; • Examples of data mining • Project: a comprehensive solution on practical problems in data mining by application of the selected tool on a real problem
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Temeljni literatura in viri / Readings:

<ul style="list-style-type: none"> • Galit Shmueli, Galit, Bruce, Peter C., Patel, Nitin R. (2016): Data mining for business analytics. Wiley. • Tan, Pang-Ning, Steinbach, Michael, Kumar, Vipin, Karpante, Anuj (2018). <i>Introduction to data mining</i>, Pearson Addison Wesley. (2nd Edition) (izbrana poglavja). • Aggarwal, Charu C. (2015): Data Mining, The Textbook. Springer. • Han, Jiawei, Kamber, Micheline, Pei, Jian (2012): <i>Data Mining: Concepts and Techniques, third edition ed.</i> Morgan Kaufmann. • Zupan, Blaž in Demšar, Damjan (2018): Introduction to data mining. Working notes for the hands-on course with Orange Data mining. University of Ljubljana. Dostopno prek: https://file.biolab.si/notes/2018-05-intro-to-datamining-notes.pdf • Mileva Boshkoska, Biljana. Prosojnice iz predavanj in vaj pri predmetu Podatkovno rudarjenje, Moodle, FIŠ.
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Cilji in kompetence:

<p><i>Cilj predmeta je študentom predstaviti osnovne ideje in principe na katerih temeljijo metode za podatkovno rudarjenje, ter jih seznaniti s paradigmi uporabe nekaterih najpomembnejših orodij.</i></p> <p><i>Učna enota prispeva k razvoju naslednjih splošnih in predmetno specifičnih kompetenc:</i></p> <p><i>Splošne kompetence:</i></p> <ul style="list-style-type: none"> • sposobnost fleksibilne uporabe znanja v praksi;
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Objectives and competences:

<p><i>The aim of the course is to present students the basic ideas and principles which underlie methods for data mining and to acquaint them with the paradigms of some important tools.</i></p> <p><i>The instructional unit contributes to the development of the following general and subject-specific competences:</i></p> <p><i>General competences:</i></p> <ul style="list-style-type: none"> • the ability of flexible usage of knowledge in practice;

<ul style="list-style-type: none"> • obvladovanje sodobnih orodij in specifične programske opreme za obdelavo podatkov. • razvoj kritične in samokritične presoje; <p><i>Predmetno-specifične kompetence:</i></p> <ul style="list-style-type: none"> • sposobnost sinteze izvirnih idej, konceptov in rešitev določenih problemov iz različnih disciplinarnih področij; • poznavanje programskih orodij in metodologij za analizo podatkov ter simulacije diskretnih oziroma zveznih modelov; 	<ul style="list-style-type: none"> • mastering cutting edge tools and corresponding software for data processing; • development of critical and self – critical judgement; <p><i>Subject-specific competences:</i></p> <ul style="list-style-type: none"> • competence to form original ideas, concepts and solutions for specific problems from different disciplines; • knowledge of programming tools and methodologies for data analysis and simulation of discrete and continuous models;
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Predvideni študijski rezultati:

<p>Znanje in razumevanje:</p> <p><i>Sposobnost študenta/študentke bo:</i></p> <ul style="list-style-type: none"> • poznavanje pojmov, nalog in standardov podatkovnega rudarjenja • razumevanje osnovnih principov, na katerih temeljijo postopki za podatkovno rudarjenje • pravilna in samostojna uporaba nekaj aktualnih programskih orodij za podatkovno rudarjenje
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Intended learning outcomes:

<p>Knowledge and understanding:</p> <p>Students will:</p> <ul style="list-style-type: none"> • understand the concepts, tasks and standards of data mining • understand the basic principles underlying the procedures for data mining • independently use of some current software tools for data mining
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Metode poučevanja in učenja:

<ul style="list-style-type: none"> • <i>predavanja</i> z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje primerov) • <i>laboratorijske vaje</i> pri teh vajah bodo študentje spoznali aktualna programska orodja za podatkovno rudarjenje in jih uporabili za reševanje konkretnih problemov; vaje bodo potekale v manjših skupinah v računalniški učilnici, tako da bo imel vsak študent na razpolago svoj računalnik • <i>projekt</i>, ki ga študentje pripravijo v manjših skupinah; vključeval bo
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Learning and teaching methods:

<ul style="list-style-type: none"> • lectures with active participation of students (explanation, discussion, questions, examples, case studies) • laboratory work on these exercises, students will learn about the current software tools for data mining and use them to solve concrete problems; Exercises will be held in small groups in the computer lab so that each student will have own computer • project that students will prepare in small groups; a concrete problem in the field of data mining by using selected data mining framework

konkreten problem s področja podatkovnega rudarjenja, katerega bodo morali študenti z izbiro pravih orodja samostojno obdelati	
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Delež (v %) /
Weight (in %)

Načini ocenjevanja:

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
<ul style="list-style-type: none"> • pisni izpit • projekt 	<p>50 %</p> <p>50 %</p>	<ul style="list-style-type: none"> • written exam • project

Reference nosilca / Lecturer's references:

- MILEVA BOSHKOSKA, Biljana, MILJKOVIĆ, Dragana, VALMARSKA, Anita, GATSIOS, Dimitros, RIGAS, George, KONITSIOTIS, Spyros, TSIOURIS, Kostas M., FOTIADIS, Dimitrios I., BOHANEK, Marko. Decision support for medication change of Parkinson's disease patients. *Computer methods and programs in biomedicine*, ISSN 0169-2607. [Print ed.], [in press] 2020, 35 str., doi: [10.1016/j.cmpb.2020.105552](https://doi.org/10.1016/j.cmpb.2020.105552).
- HAJNIĆ, Miljenko, MILEVA BOSHKOSKA, Biljana. A decision support model for the operational management of employee redeployment in large governmental organisations. *Journal of decision systems*, ISSN 1246-0125, [in press] 2020, doi: [10.1080/12460125.2020.1768681](https://doi.org/10.1080/12460125.2020.1768681).
- BOŠKOSKI, Pavle, DEBENJAK, Andrej, MILEVA-BOSHKOSKA, Biljana. Rayleigh copula for describing impedance data - with application to condition monitoring of proton exchange membrane fuel cells. *European journal of operational research*, ISSN 0377-2217. 2018, vol. 266, no. 1, str. 269-277.
- ZHAO, Guoqing, LIU, Shaofeng, LOPEZ, Carmen, LU, Haiyan, ELGUETA, Sebastian, CHEN, Huilan, MILEVA BOSHKOSKA, Biljana. Blockchain technology in agri-food value chain management : a synthesis of applications, challenges and future research directions. *Computers in industry*, ISSN 0166-3615. [Print ed.], 2019, vol. 109, str. 83-99
- MILEVA BOSHKOSKA, Biljana, LIU, Shaofeng, ZHAO, Guoqing, FERNANDEZ, Alejandro, GAMBOA, Susana, PINO, Mariana del, ZARATÉ, Pascale, HERNANDÉZ, Jorge, CHEN, Huilan. A decision support system for evaluation of the knowledge sharing crossing boundaries in agri-food value chains. *Computers in industry*, ISSN 0166-3615. [Print ed.], 2019, vol. 110, str. 64-80, doi: [10.1016/j.compind.2019.04.012](https://doi.org/10.1016/j.compind.2019.04.012).