MEĐIMURSKO VELEUČILIŠTE U ČAKOVCU
MEĐIMURJE UNIVERSITY OF APPLIED SCIENCES IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR:	2025/2026

1. GENERAL COURSE INFORMATION

1.1 Course name	Pattern recognition			
1.2 Study program/s	Undergraduate professional study of Computer Science			
1.3 Course status (O,E)	E	**1.6 Mode of instruction (number of hours)**	**Lectures**	30
1.4 Course code			**Exercises**	30
1.5 Course abbreviation			**Seminars**	
1.6 Semester	VI		**E-learning**	Merlin
1.7 ECTS	4	**1.7 Place and time of instruction**	The premises of the Međimurje University of Applied Sciences in Čakovec, according to the schedule published on the website	

2. TEACHING STAF.F

2.1 Course leader/s-title	PhD, Bruno Trstenjak, prof.	**contact**	btrstenjak@mev.hr
		contact	
2.2 Assistant/s- title		**contact**	
		contact	
2.3 Instruction held by-title	PhD, Bruno Trstenjak, prof.	**contact**	btrstenjak@mev.hr
2.4 Course leader/s-title		**contact**	

3. COURSE DESCRIPTION

3.1. Course goals	After completing the course, the student will be able to use Python to recognize patterns. Knowledge in the field of artificial intelligence and machine learning is acquired
3.2 Prerequisites	Knowledge of the Python programming language is desirable for taking the course, but it is not necessary
3.3 Course outcomes	After successfully completing the course, students will be able to: O1 - Prepare tools for machine learning and pattern recognition O2 - Identify data sources required for machine learning O3 - Solve simple linear regression and classification tasks, clustering using Python programming language O4 - Solve simple tasks using a simple neural network and decision tree
3.4 Contribution of the course to the study program	
3.5 Course content	The course presents contents related to the concept, possibilities and role of the database. Special attention is given to data search using SQL language, modeling and database maintenance. In the practical part, open source tools are used.

3.6 Types of coursework	X	Lectures	X	Exercises		Blended e-learning	X	Individual activities		Laboratory
		Seminars and workshops		Distant learning		Field classes	X	Multimedia and network		Mentorship
		Other								

3.7 Language of instruction	Croatian					
3.8 Monitoring students' work (enter the number of ECTS credits for each activity so that the total number of ECTS credits is equal to the total ECTS value of the course, 1 ECTS = 30 hours)	1,00	Class attendance		Seminars		Research
	1,00	Midterm exams/written exam		Project		Essay
	1,00	Oral exam	1,00	Practical task		

Activity specification	Percent %	Points
Assessment during instruction		
Attendance	10%	10
Practical work	30%	30
Midterm exam 1	30%	30
Midterm exam 2	30%	30
Exam assessment for the students who failed to fullfil all the obligatory requirements during the semester		
Written exam	*60%*	*60*
Total:	**100%**	**100**

Points Grade
89 – 100 excellent (5)
76 – 88 very good (4)
63 – 75 good (3)
50 – 62 pass (2)
 0 – 49 fail (1)

3.9 Specific features related to taking the course	*If a student collects 50% of the points of each outcome he/she directly accesses the oral exam. If a student does not achieve a sufficient number of points on the midterm exam, he/she cannot take the next midterm exam, and has to take the written exam.* *If he/she passes the written exam, he/she will proceed to the oral part of the exam.* *The seminar paper is submitted within the agreed deadline, and certainly before the exam term.* *The final grade is given on the oral part of the exam.*
3.10 Students obligations	• a full-time student has the right to sit for the exam if he attends classes for a minimum of 70% of the total prescribed number of hours • a full-time student who attends classes from 50 to 70% of the total prescribed number of hours can exercise the right to take the exam by completing additional teaching activities in agreement with the course teacher • a full-time student who attends a certain course for less than 50% of the prescribed number of hours enrolls in the course the following academic year • a part-time student has the right to sit for the exam if he/she attends classes for a minimum of 30% of the total prescribed number of hours • a part-time student who attends classes for 20 to 30% of the total prescribed number of hours can exercise the right to sit for the exam by completing additional teaching activities in agreement with the course teacher • a part-time student who attends the classes of a certain course for less than 20% of the prescribed number of hours re-enrolls in the course the following academic year

3.11 Written assignments		
3.12 Required reading		Zsolt Nagy, Artificial Intelligence and Machine Learning Fundamentals 1st Edition, 2018.
3.13 Additional reading		https://scikit-learn.org/stable/auto_examples/index.html#examples
		https://jakevdp.github.io/PythonDataScienceHandbook/index.html

4. ADDITIONAL INFORMATION ABOUT THE COURSE

4.1 Quality control	The quality of the program, teaching process, teaching skills and level of mastery of the material will be established by conducting a written evaluation based on questionnaires, and in other standardised ways and in accordance with the by-laws of the Međimurje University of Applied Sciences in Čakovec.
4.2 Contact the teacher	Students can contact the teacher during the office hours and during classes. All other methods of communication are arranged with the teacher. It is also possible to ask questions by e-mail, which will be answered in 48 hours at the latest. It is desirable for students to come as often as possible for any possible questions during the teacher's office hours.
4.3 Information about the course	It is the obligation of each student to be regularly informed about the course. All notifications about the classes or possible postponement of classes will be posted on the bulletin board and on the website of the University at least 24 hours in advance.

5. ELABORATION OF THEMATIC UNITS

Week	Topic	Course outcome
1.	Introduction to the content of the course, the concept of data analysis and processing (Data science)	O1
2.	Introduction to Python programming language, Numpy data structure	O2
3.	Advanced Numpy methods. Advanced indexing. The concept of random numbers	O2
4.	Getting to know modules for data visualization	O2
5.	Basic algorithms for data processing. Linear classification and linear regression	O3
6.	Colloquium	
7.	Data structures in the form of tables. Pandas Library	O3
8.	Advanced data processing in the Pandas library. Filtering and aggregation	O3
9.	Advanced regression and classification methods	O3
10.	Clustering procedure and connection with classification	O3
11.	Basics and concept of neurocomputing	O4
12.	Architecture of neural networks and learning algorithms	O4
13.	Decision trees (entropy. Gini Impurity)	O4
14.	Examples from practice	O4
15.	Colloquium	