

<b>Cyber-physical Systems Institute</b>			Semester 4. of the curriculum 2025-26-2			
Name of the subject:	Code of the subject:	Credits:	Hours per semester:			
			lec	sem	lab	
<b>Intelligent Systems</b>	NIXIR0EBNE	3	full-time	1	0	2
Responsible person for the subject: Prof. Dr. Molnár András			Classification: professor			
Subject lecturer(s): Máté Siket						
Prerequisites:						
Way of the assessment: midterm grade						
<b>Course description</b>						
Goal:	The goal of the subject is to provide a general overview of learning algorithms, introduce concepts in machine learning. The introduced algorithms will be implemented in Python or Matlab.					
Course description:	The course focuses on introducing concepts such as training, validation, testing, loss functions, classification, regression. The course mostly focuses on linear regression. multilayer perceptron models, and their implementation.					

<b>Lecture schedule</b>	
Education week	Topic
1.	Introduction
2.	Learning algorithms and their classifications
3.	Prediction, inference, metrics, training, test datasets
4.	Linear regression part 1
5.	Linear regression part 2
6.	Validation of models
7.	Multilayer perceptron
8.	Training of neural networks
9.	Logistic regression
10.	Clustering algorithms
11.	Project 1 implementation
12.	Project 1 implementation
13.	Project 2 implementation
14.	Project 2 implementation
<b>Mid-term requirements</b>	
Conditions for obtaining a mid-term grade/signature	
<b>Assessment schedule</b>	
Education week	Topic
5	General concepts in machine learning
8	Linear regression
11	Multilayer perceptron
14	Project work

<b>Method used to calculate the <i>mid-term grade</i></b> (to be filled out only for subjects with mid-term grades)													
The 3-weekly oral assessments are graded from 1 to 5, the mid-term grade is evaluated as the average of the 4 grades.													
<b>Type of the replacement</b>													
Type of the replacement of written test/mid-term grade/signature	Oral exam on the theoretical part and presentation of the project work.												
<b>Type of the exam</b> (to be filled out only for subjects with exams)													
-													
<b>Calculation of the exam mark</b> (to be filled only for subjects with exams)													
-													
<b>Final grade calculation methods:</b>													
The final grade will be calculated using the following scale:													
	<table border="1"> <thead> <tr> <th>Achieved result</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>85 - 100%</td> <td>excellent (5)</td> </tr> <tr> <td>70-85</td> <td>good (4)</td> </tr> <tr> <td>55-70</td> <td>satisfactory (3)</td> </tr> <tr> <td>40-55</td> <td>pass (2)</td> </tr> <tr> <td>0 - 40%</td> <td>failed (1)</td> </tr> </tbody> </table>	Achieved result	Grade	85 - 100%	excellent (5)	70-85	good (4)	55-70	satisfactory (3)	40-55	pass (2)	0 - 40%	failed (1)
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55-70	satisfactory (3)												
40-55	pass (2)												
0 - 40%	failed (1)												
<b>References</b>													
Obligatory:	Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Jonathan Taylor: An Introduction to Statistical Learning. Springer, 2023. ISBN: 978-3-031-38747-0												
Recommended:	Kevin P. Murphy: Probabilistic Machine Learning, An Introduction. MIT Press, 2022. ISBN: 9780262046824.												
Other references:													