Óbuda University Bánki Donát Faculty of Mechanical and Safety Engineering	Insitute of Mechatronics and Vehicle Engineering

Subject title and code: Introduction to Machine Learning BMXBGE5BNF **Credits:** *4*

Full-time study 2025/2026 *ac.* 1 *semester year*

The course is available at: mechatronical engineering BSc

Supervised by: Andrew Frigyik, PhD **Instructors:** Andrew Frigyik, PhD

Prerequisite (neptun code):

Weekly number of lessons

Lecture: 1	Group seminar: 0	Lab:2	Consultation: 0

Way of assessment: Midterm mark (Written)

Online consultation *(in case it's required):* *... (BBB link)*

Edu. goal: The purpose of the course is to survey the basic methods of machine learning. The students will get familiar with some basic statistical learning methods first and with more advanced machine learning methods later in theory and in practice. Through a sequence of Jupyter notebooks they will have an opportunity to test all the introduced methods on non-trivial databases both in the lab and at home.

Schedule

Education week	**Topics**
1.	Basic idea of statistical learning, Python introduction/refresher
2.	Simple and multiple Linerar Regression
3.	Classification using Logistic Regression, Linear and Quadratic Discriminant Analysis, as well as K-Nearest Neighbors model
4.	Cross-Validation and Bootstrap methods
5.	Linear Model Selection and Regularization, Dimension Reduction method
6.	Non-linear methods: Polynomial Regression, Splines and Generalized Additive Models
7.	Tree-Based methods: Decision Trees, Bagging, Random Forests
8.	Support Vector Classifiers and Machines
9.	Single Layer and Multilayer Neural Networks, Convolutional Neural Networks, Deep Learning
10.	Time related methods: Survival Analysis and Censored Data
11.	**Rector's Holiday**
12.	Unsupervised Learning: Principal Component Analysis, Clustering methods
13.	Methods for Inference: Multiple Testing
14.	Overview

Mid-semester requirements

Test		Assignment to be submitted		Lab measurement	
amount	dates	amount	deadlines	amount	dates
		12	weekly		

According to the HKR attendance of group seminars and lab exercises are mandatory.

Other requirements for participation in sessions not covered by the regulations and restrictions on substitutions:

Test		Assignment to be submitted		Lab measurement	
maximum points available	minimum score required to pass /test	maximum points available	minimum score required to pass / assignment	maximum points available	minimum score required to pass /lab
…points	…points	100 points	50 points	…points	…points

Total number of points achievable in semester: …points				
Grading thresholds	**satisfactory** 50 % and above	**average** 63 % and above	**good** 76 % and above	**excellent** 90 % and above
Other evaluation criteria: The grade is entirely based on the assignments. Assignments can be resubmitted for a better grade.				
Receive a signature denied entry:				
Required references:				
Recommended references:	Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Jonathan Taylor; An Introduction to Statistical Learning with Applications in Python; Springer 2023			
Quality assurance methods of the subject:				

Things, that are not included, can be found within the regulations of Óbuda University.