

Study program:Artificial intelligence			
Name of the subject: Programming and Software Engineering for Machine Learning			
Teacher(s):Sanja Brdar			
Status of the subject:obligatory			
Number of ECTS credits:6			
Conditions: none			
Subject goal			
<ul style="list-style-type: none"> - Acquiring the fundamental principles of data science and data-analytic thinking - Acquiring the fundamental principles of decision making and data-driven approaches - Learning Python coding skills for modelling and analysing of a broad range of datasets - numerical, string, and more complex data formats - Translate a simple algorithm into a Python code - Learning how to effectively visualise results 			
Outcome of the subject			
<ul style="list-style-type: none"> - Mastering basics of analysis and processing of data - Ability to write scripts in Python with basic programming concepts like loops, arrays, dictionaries, strings, if statements, functions and classes - Exploratory data analysis: create plots and summary statistics - Develop practical skills in problem solving by working on diverse data 			
Subject content			
<i>Theory</i>			
<ul style="list-style-type: none"> - Develop skills necessary for data-driven applications and decision making 			
<i>Practical learning</i>			
<p>Develop skills necessary to use Python for data analysis: Learn data structures: lists, tuples, dictionaries Learn to write, test, and debug Python code Learn scientific libraries in Python: NumPy (multidimensional array objects, linear algebra operations), SciPy (matrix decompositions, sparse matrices, statistical tests), Networkx (structure and analysis measures for graphs), Pandas (structured data, slicing, aggregating, and selecting subsets of data), Seaborn and Matplotlib (drawing attractive statistical graphics and visualizations)</p> <ul style="list-style-type: none"> - Expert from the industry will be included into the project assignment realization as an external tutor. 			
Literature			
<ol style="list-style-type: none"> 1. Mohammed J. Zaki and Wagner Meira, Jr, "Data Mining and Machine Learning: Fundamental Concepts and Algorithms", Second Edition, Cambridge University Press, 2020 2. Michel Bierlaire, Optimization: Principles and Algorithms, The EPFL Press, 2015 3. Wes McKinney, "Python for Data Analysis, O'Reilly Media", 2012. 4. Ron Zacharski, "A Programmer's Guide to Data Mining", 2012. 			
Number of active teaching classes	Theoretical teaching:3	Practical teaching:2	
Method of carrying out the teaching			
Lectures; revisions of the material; active students' participation in problem solving; homework assignments; application of the taught material on real-world examples.			
Evaluation of knowledge (maximum number of points 100)			
Pre-exam obligations	points	Final exam	points
Programming Test	20	Preparation and defence of course project	50
		Theoretical exam	30