



Subject card

Subject name and code	Advanced data mining, PG_00045380						
Field of study	Data Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2025/2026		
Education level	first-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	4	Language of instruction			English		
Semester of study	7	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Software Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Aleksandra Karpus				
	Teachers		dr inż. Aleksandra Karpus				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		0.0		70.0	100
Subject objectives	The aim of the course is to introduce students to the subject of exploration and visualization of large data-sets using modern functional languages and statistical packages on top of a scalable computing cluster.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W07] Knows the methods of information processing, storage, extraction of data stored in various models including: relational, graph and document ones		The student is able to clean up and prepare large collections of data, aggregate, extract and save it into the distributed file system as well as graph databases.		[SW1] Assessment of factual knowledge		
	[K6_U01] programs in procedural, object, functional and logic programming languages, codes programs at the processor instruction level, runs and tests programs.		The student is able to run a distributed algorithm in a Scala functional language using Spark environment. The student is able to visualize the data using the R platform.		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K6_W08] Knows the models and structure of the data mining process and their multidimensional analysis and can assess the results of such analyses		Student is able to create a recommendation systems, classifiers, decision trees, group data and detect anomalies as well as calculate AUC. The student is able to visualize the result of data-processing		[SW1] Assessment of factual knowledge		

Subject contents	<ol style="list-style-type: none"> 1. Introduction to Scala 2. Introduction to the R language 3. Functional Languages like Scala and R in context of the platform Spark 4. Preparation of the data 5. The model recommendation method via least squares 6. Evaluation of the quality of recommendation system 7. Decision Trees 8. Tuning of hyper-parameters 9. Forecasting 10. Data visualization in R 11. Anomaly detection (K-means clustering) 								
Prerequisites and co-requisites	Knowledge of programming in Java, basic knowledge of programming languages function and statistics.								
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Subject passing criteria</th> <th style="text-align: center;">Passing threshold</th> <th style="text-align: center;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">practical exercises</td> <td style="text-align: center;">60.0%</td> <td style="text-align: center;">100.0%</td> </tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	practical exercises	60.0%	100.0%		
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Recommended reading	Basic literature	https://www.r-project.org/ http://www.scala-lang.org/ http://spark.apache.org/							
	Supplementary literature	S.Ryza, U.Laserson, S.Owen & J.Wills, Advanced Analytics with Spark (Spark. Zaawansowana analiza danych), O'Reilly (Helion) Karau, H., Konwinski, A., Wendell, P., Zaharia, M.: Learning Spark: Lightning-Fast Big Data Analysis. O'Reilly, 2015							
	eResources addresses								
Example issues/ example questions/ tasks being completed	During the workshop student creates and tests music recommendation model.								
Work placement	Not applicable								