DATA EXPLORATION AND ANALITYCS

Faculty of Computer Science				
Study programme:	**Computer Science**		Degree level:	**Engineer's degree full-time programme**
Specialization	**---**		Diploma path:	**2026/2027W - 2026/2027S**
Module name:	**Data Exploration and Analitycs** (Eksploracja danych)			
Module type:	**obligatory**	**Semester: 1**	ECTS:**4**	Module ID:**FCS-00091**
No. of hrs in semester:	Lecture (L) - **30** Classes(C) - **0** Specialization workshop (SW) - **30** Project (P) - **0** Laboratory classes (LC) - **0** Seminar (S) - **0**			
Prerequisites	-			

Aims and objectives:	The course prepares the student to select and apply independently methods and algorithms to data mining tasks often encountered in practice. Special attention will be paid to computational aspects related to the implementation of tasks of mining large data sets.		
Forms of teching activities::	lecture, specialization workshop,	Assessment:	Evaluation must be relevant to the intended learning outcomes:
			Lecture - oral evaluation SW - realization of partial tasks, evaluation of reports from partial tasks, realization and presentation of the project
Module content:	L: Data preprocessing. Selection of variables for analysis. Principal components method. Methods of classification (linear and nonlinear decision rules, Bayesian decision rules), regression, clustering. Evaluation of classifiers. Classification and regression trees. Methods of discovering associations in data, sequence patterns. Survival analysis. Multidimensional scaling. Linear separability of multidimensional datasets, linearization of datasets by rank layers of binary classifiers. Application of selected methods and algorithms for detecting regularities (patterns) in large data sets will also be analyzed. SW: Preparing data for analysis (normalization, standardization, discretization). Selected algorithms for data classification. Selected cluster analysis algorithms. Decision tree. Association rules. Random forests. Bagging and boosting. Evaluation of obtained models.		
Teaching methods:	project method, programming, informative lecture,		

Learning outcomes

Symbol	Specify min. 4, max. 8 learning outcomes in the following order: knowledge – skills – competence. Each learning outcome must be verifiable	Reference to the programme learning outcomes of education
LO1	knows basic methods, techniques and tools used in data exploration	
LO2	is able to use the known methods and models for the analysis and evaluation of algorithms and for data analysis	
LO3	can construct models in the area of data exploration and skillfully use them	
LO4	can practically use basic methods, techniques and tools for data exploration	

No. of learning outcome	Methods of assessing the learning outcome	Type of teaching activities (if more than one) during which the outcome is assessed
LO1	pass a lecture	L
LO2	project evaluation, project presentation, evaluation of reports	SW
LO3	project evaluation, project presentation, evaluation of reports	SW
LO4	project evaluation, project presentation	SW

Student's workload (in hours)	**1** - Participation in practical classes		30
	2 - Participation in lectures		30
	3 - Preparation of reports and carrying out homework	None	10
	4 - Preparation for passing	None	15
	5 - Implementation of project tasks (including preparation of presentations)	None	15
		TOTAL:	**100**
Quantitative indicators	Student's workload - activities that require direct teacher participation: (2)+(1)	60	**ECTS**
			2.4
	Student's workload connected with practical classes (3)+(5)+(1)	55	2.2

Basic references:	1. R. O. Duda, P. E. Hart, D. G. Stork, Pattern Classification, John Wiley, wydanie drugie, New York, 2001.
Further reading	1. R. A. Johnson, D. W. Wichern: Applied Multivariate Statistical Analysis, Prentiice-Hall, Upper Saddle River 2002.

Unit:	Software Department	Lecturer/ instructor	
Date of issuing the programme:	31st March 2026	Author of the programme:	dr inż. Magdalena Topczewska

L - lecture, C - classes, LC - laboratory classes, P-project, SW - specialization workshop, S - seminar