GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Data Science, PG_00068520		
Field of study	Engineering Management		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department Of Informatics In Management -> Faculty Of Management And Economics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Nina Rizun	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	8.0	0.0	16.0	0.0	0.0	24

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	24	5.0	96.0	125

Subject objectives

The subject aims to develop data analysis skills in the context of management and decision-making. Participants will learn data mining methods, statistical analysis, machine learning and the principles of responsible use of data. Particular emphasis is placed on solving practical problems and the use of advanced information technologies.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K03] is prepared to critically assess the knowledge they possess, which is necessary for solving cognitive and practical problems, and to supplement any gaps with opinions from external experts.	The student is able to critically evaluate his/her knowledge of data analysis, identify its gaps and effectively supplement them using the opinions and expertise of external specialists.	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
[K6_W05] possesses advanced knowledge in integrating data from various sources and in the methods that enable a comprehensive analysis of contemporary management issues.	The student has advanced knowledge of data integration from various sources and is able to use appropriate analytical methods for comprehensive analysis of contemporary management problems.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_U07] uses advanced information technologies to enhance data analysis and management processes.	The student is able to use advanced information technologies (including analytical and visualization systems and machine learning) to improve data analysis and support decision-making and management processes.	[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information

Subject contents	1. **Introduction to Data Science and the Analytical Cycle** • Stages of the data analysis process • The role of data in management and innovation 2. **Data Exploration and Visualization** • Exploratory and descriptive techniques • Data visualization and storytelling 3. **Data Preparation and Integration** • Cleaning, transforming, and merging data • Formatting data for analysis 4. **Statistics and Inference** • Hypothesis testing, correlations, group comparisons • Confidence intervals and analysis of variance 5. **Machine Learning and Predictive Modeling** • Regression, decision trees, classification • Model validation and error analysis 6. **Unsupervised Learning and Dimensionality Reduction** • Clustering, PCA • Customer segmentation and pattern analysis 7. **Information Technologies in Data Analysis** • BI platforms, dashboards, automation of analysis • Overview of tools (e.g., R, Python, Power BI, Tableau) 8. **Data Ethics and Social Responsibility** • Data privacy rights, algorithmic transparency • Sustainable approaches to data use 9. **Capstone Project (Case Study)** • Solving a real-world analytical problem • Presentation of results and analytical report
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Final test	60.0%	40.0%
Project	60.0%	40.0%
Laboratory work	60.0%	20.0%

Recommended reading	Basic literature	1. SANDY RYZA, URI LASERSON, SEAN OWEN, JOSH WILLS, ADVANCED ANALYTICS WITH SPARK: PATTERNS FOR LEARNING FROM DATA AT SCALE, 1ST EDITION, 2015, 978-1491912768 2. RUSSELL WALKER (2015) "FROM BIG DATA TO BIG PROFITS: SUCCESS WITH DATA AND ANALYTICS", OXFORD UNIVERSITY PRESS INC 3. VINCENZO MORABITO (2015) "BIG DATA AND ANALYTICS STRATEGIC AND ORGANIZATIONAL IMPACTS", SPRINGER

	Supplementary literature	1. NATHAN MARZ, JAMES WARREN (2015) BIG DATA. PRINCIPLES AND BEST PRACTICES OF SCALABLE REALTIME DATA SYSTEMS., MANNING PUBLICATIONS. 2. "BIG-DATA ANALYTICS AND CLOUD COMPUTING. THEORY, ALGORITHMS AND APPLICATIONS" (2015) MARCELLO TROVATI, RICHARD HILL, ASHIQ ANJUM, SHAO YING ZHU, LU LIU (EDS.), SPRINGER 3. MARK GROVER, TED MALASKA, JONATHAN SEIDMAN, GWEN SHAPIRA, HADOOP APPLICATION ARCHITECTURES 1ST EDITION, 2015, 978-1491900086 4. MICHAEL MALAK, ROBIN EAST, SPARK GRAPHX IN ACTION 1ST EDITION, MANNING PUBLICATIONS, 2016, 978-1617292521 5. GRANT S. INGERSOLL, THOMAS S. MORTON, ANDREW L.FARRIS (2013), TAMING TEXT. HOW TO FIND, ORGANIZE AND MANIPULATE IT, MANNING PUBLICATIONS CO. 6. "GRAPH-BASED SOCIAL MEDIA ANALYSIS" (2015) JOANNIS PITAS (ED.), CHAPMAN AND HALL/CRC 7. BENJAMIN BENGFORT, JENNY KIM, DATA ANALYTICS WITH HADOOP: AN INTRODUCTION FOR DATA SCIENTISTS 1ST EDITION, 2016, 978-1491913703 8. FOSTER PROVOST, TOM FAWCETT, DATA SCIENCE FOR BUSINESS: WHAT YOU
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Which visualization methods best support decision-making processes? What is the difference between correlation and causation? How to choose the right predictive model for employee turnover analysis? Conduct customer segmentation analysis using clustering techniques. Propose a method to measure the impact of ML model implementation in a public institution. How to address ethical concerns and social risks when implementing data analytics?	
Work placement	Not applicable	

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