GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Data Science, PG_00068066						
Field of study							
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	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		English		
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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Anna Trzaskowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	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	45		5.0		75.0	125
Subject objectives	The course aims to familiarize students with the data analysis process in organizations and develop skills in utilizing data science methods in management decision-making. Students will learn the stages of the analytical process, including data acquisition, preparation, exploration, and modeling, as well as the interpretation of results and their use in decision-making. Particular emphasis is placed on the practical application of analytical tools, data visualization, and basic machine learning methods in the context of business problems and the digital transformation of organizations.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 knowledge of the data analysis process in an organisation, in particular, methods of integrating data from various sources, preparing data for analysis and basic data mining and modelling methods used in the analysis of management problems.	[SW3] Assessment of knowledge contained in written work and projects
	[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 ready to critically evaluate the results of data analyses, identify the limitations of the analytical models used, and take into account ethical aspects and the responsible use of data in the organisation.	[SK1] Assessment of group work skills [SK2] Assessment of progress of work [SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
	[K6_U07] uses advanced information technologies to enhance data analysis and management processes.	The student can prepare data for analysis, apply selected data mining and predictive modelling methods, and use analytical and visualisation tools to interpret results and support decision-making processes within the organisation.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task

Subject contents

Course content – lecture

1. Introduction to Data Science in Organizations
The Role of Data in an Organization's Digital Transformation
Data-Driven Decision Making
Data Analysis Process (CRISP-DM)
2. Data Sources in an Organization
Operational and Analytical Data
Databases, Data Warehouses, and Business Intelligence Systems
Overview of Data Sources Used in Business Analysis
3. Preparing Data for Analysis
Integrating Data from Various Sources
Data Cleaning and Transformation
Data Quality and the GIGO (Garbage In Garbage Out) Problem
4. Exploratory Data Analysis (EDA)
Descriptive Statistics in Data Analysis
Identifying Relationships and Patterns
Data Visualization in Exploratory Analysis
5. Data Visualization and Communication of Results
Dashboards and Analytical Reports
Data Storytelling
Supporting Decision-Making Processes
6. Predictive Modeling in Data Analysis
Regression and Classification
Decision Trees
Applications of Predictive Models in Management
7. Analytical Model Evaluation and Data Ethics
Model Validation and Interpretation of Results
Risk of Incorrect Conclusions and Model Limitations
Data Ethics, Privacy, and Responsible Data Use

Course content – laboratory

1. Introduction to Data Analysis
Familiarization with Analytical Tools
Loading and Basic Data Exploration
2. Data Acquisition and Integration
Working with Various Data Sources
Combining and Preparing Datasets for Analysis
3. Data Cleaning and Transformation
Identifying Missing Data
Transforming and Preparing Data for Analysis
4. Exploratory Data Analysis
Descriptive Statistics
Dependency and Correlation Analysis
Data Visualization
5. Data Visualization and Dashboards
Creating Analytical Charts
Building Simple Decision-Supporting Dashboards
6. Predictive Modeling
Building Basic Predictive Models
Interpreting Model Results
7. Analytical Project (Case Study)
Analysis of a Real-World Business Problem
Preparing an Analytical Report
Presenting Analysis Results

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	60.0%	20.0%
Project	60.0%	50.0%
Exercises	60.0%	30.0%

<table>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Diepeveen Mary-Jo, Artificial Intelligence with Power BI, Helion 2024
2. Gorelik Alex, The Enterprise Data Lake, Helion 2019
3. Grus Joel, Data Science from Scratch: First Principles with Python, Helion 2019
4. Provost Foster, Fawcett Tom, Data Science for Business, Helion 2013</td></tr>
<tr><td>Supplementary literature</td><td>1. Downey Allen B., Think Stats:Exploratory Data Analysis, Helion 2025
2. Stephenson David, Big Data Demystified, Helion 2020</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">• What does the data analysis process in an organization involve and what are its main stages?
• What role does data play in decision-making in organizations?
• What are the most important data sources in enterprises and what problems can arise during their integration?
• How does data preparation for analysis involve, and why is data quality crucial to analytical results?
• What is the importance of data visualization in communicating analytical results?
• How can analytical models support decision-making in an organization?
• How can data analysis results be interpreted in the context of business decisions?
• What are the most important principles for responsible data use in an organization?</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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