GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Application of Quantitative Methods in Economic Analysis, PG_00073954		
Field of study	Economics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Statistics and Econometrics -> Faculty of Management and Economics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Agnieszka Wałachowska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	30.0	0.0	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	5.0	15.0	50

Subject objectives

To prepare students to select and apply advanced quantitative methods in the analysis of economic data, develop models, and interpret results in order to address complex socio-economic and business problems. This includes acquiring knowledge of analytical methods, assessing data reliability, and processing data, as well as creatively and entrepreneurially applying research findings while respecting copyright regulations.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] leverages the knowledge acquired in the field of economics to solve challenging problems, achieving results that are economically and socially valuable.	Is able to apply quantitative methods to the analysis of economic data, the development and interpretation of multivariate models of economic phenomena, and the resolution of complex economic and social problems, taking into account the purpose of the analysis.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_W04] possesses advanced knowledge of the principles of creative and entrepreneurial activity, enabling the identification and implementation of innovative ideas while ensuring compliance with copyright protection requirements.	Knows and understands the principles of the creative and entrepreneurial application of quantitative analysis results to identify and evaluate innovative solutions to economic problems, while respecting copyright protection principles.	[SW3] Assessment of knowledge contained in written work and projects
[K6_K01] is ready to fulfill professional roles responsibly, taking legal, ethical, and cultural aspects into account in decision-making processes.	Is prepared to use the results of quantitative analyses responsibly in making and justifying decisions concerning economic problems, taking into account legal, ethical, and cultural considerations.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	Course content – exercises 1. The nature, scope, and fundamental principles of quantitative methods in economic analysis. 2. Sources of data used in economic analysis: Eurostat, the OECD, the World Bank, the International Labour Organization (ILO), and national statistical databases. 3. Selection of diagnostic variables and economic indicators, and methods for measuring similarity and distance between objects. 4. Transformation, standardization, and normalization of economic data. 5. Methods of linear ordering of economic objects and assessment of ranking similarity. 6. Cluster analysis in economic research: hierarchical methods, the k-means method, and density-based clustering (DBSCAN). 7. Identification of groups of economic objects and selection of cluster representatives. 8. Principal Component Analysis (PCA) for dimensionality reduction and identification of the main factors underlying the variation in economic phenomena. 9. Sparse Principal Component Analysis (Sparse PCA) and its applications in economic data analysis. 10. Factor analysis for identifying latent conditions and determinants of economic processes. 11. Correspondence analysis for examining relationships between qualitative variables describing economic phenomena. 12. Discriminant analysis for classifying economic objects and predicting their group membership.
Prerequisites and co-requisites	

Assessment methods and criteria

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

Recommended reading	Basic literature	Balicki A. (2013). Statystyczna analiza wielowymiarowa i jej zastosowania społeczno-ekonomiczne Panek T. Zwierzchowski J. (2013). Statystyczne metody wielowymiarowej analizy porównawczej. Teoria i zastosowania Daniel J. Denis (2021). Applied Univariate, Bivariate, and Multivariate Statistics : Understanding Statistics for Social and Natural Scientists, with Applications in SPSS and R Rencher A. Christensen W. (2011). An Introduction to Applied Multivariate Analysis with R
	Supplementary literature	Walesiak M. Gatnar E. (2009). Statystyczna analiza danych z wykorzystaniem programu R Rencher A. Christensen W. (2012). Methods of Multivariate Analysis
	eResources addresses	
Example issues/ example questions/ tasks being completed	What is the k-means method, and how can it be used to identify groups of enterprises or regions with similar economic characteristics? How do linear ordering methods enable the creation of rankings of economic entities, and what limitations should be considered when interpreting the results? How does correspondence analysis help identify relationships between qualitative variables describing economic phenomena?	
Practical activites within the subject	Not applicable	

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