

Subject card

Subject name and code	Analytical Software and Data Visualization - A, PG_00178104						
Field of study	Informatics and Econometrics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's 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	3		ECTS credits		7.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Department of Econometrics -> Faculty of Management -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr Tomasz Jastrzębski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	30.0	30.0	0.0	0.0	75
	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	75		4.0		96.0	175
Subject objectives	1. To become familiar with IT tools for statistical and econometric analysis and data presentation. 2. To acquire the ability to independently prepare software for data analysis, visualisation and computer simulation.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[liEL3_U03] Students can obtain data from appropriately selected sources, use these data to solve economic and social problems, and process and interpret them using econometrics, informatics or statistics tools.	The student is able to use various data sources and apply appropriate methods of data acquisition and processing using appropriate IT, statistical or econometric tools in order to perform socio-economic analyses.	[SU2] presentation/project/paper/report
	[liEL3_W06] To an advanced degree, the student knows and understands the processes and methods of creating, developing, and providing appropriate conditions for using informatics or statistics tools, particularly those that improve human and organizational functioning.	The student knows and is able to select appropriate IT tools (taking into account their limitations) enabling the acquisition, processing and analysis of data reflecting the functioning of the organization and the processes taking place in its environment.	[SW2] presentation/project/paper/report
	[liEL3_U02] Students can select or construct econometrics, informatics or statistics tools and apply them to describe and solve economic and social problems.	The student is able to select or construct econometric, IT or statistical tools enabling the acquisition, processing and analysis of data reflecting the functioning of phenomena and processes occurring in the socio-economic environment.	[SU2] presentation/project/paper/report
	[liEL3_W05] To an advanced degree, the student knows and understands the methods, techniques and informatics or statistics tools used to acquire, collect, process and present data in decision-making processes.	The student knows and is able to select appropriate IT tools (taking into account their limitations) enabling the acquisition, processing and analysis of data reflecting the functioning of the organization and the processes taking place in its environment.	[SW2] presentation/project/paper/report
Subject contents	Python: Anaconda: download and installation; Jupyter Notebook environment, Spyder, PyCharm, Google Colab; Philosophy of the Python language ; Instructions and loops ; Building user functions; Actions on matrices and vectors; Using the software in computer simulations; Data frames; Data frames; Visualisations in python; Interactive visualisations in python; Data preparation and data frame analysis in practice. SPSS: General information about the programme; Programme windows: data editor window, report window, commands; Working on a sample dataset; Defining variables and values; Retrieving data from external files; Statistical analysis; Transforming variables; Weighting data; Filtering a dataset; Subgroup analysis; Data validation; Creating and editing charts and reports in PS IMAGO DESIGNER; Automating work (SPSS Syntax scripting language). Excel: Excel's built-in statistical functions, uses and limitations; Methods for calculating characteristics not included in Excel; Performing statistical analyses in Excel for statistical data analysis; Using the Data Analysis tool in statistical analysis; Downloading/exporting data (csv), organizing data (variable formats), creating charts. Statistica: General information about the programme; Programme windows: data editor, report window, commands; Working on a sample dataset; Defining variables and values; Retrieving data from external files; Statistical analysis; Transforming variables; Weighting data; Filtering a dataset; Analysis in subsets; Data validation; Creating and editing charts; Automation of work (single analysis macros, global macros). R: Philosophy of the R language; Importing data; Selecting subsets; Variable types; Variable names, variant labels for factors; Descriptive statistics; Transforming data and structures. Conditional analysis; Storing results; Transforming data using the dplyr package ; Loops and conditional statements; Building user functions; Computer simulations; Creating visualisations in graphics and related packages; Creating visualisations in ggplot2 and related packages; Creating a report and working in R Markdown.		
Prerequisites and co-requisites	Knowledge of descriptive statistics and mathematical statistics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project 1 (Python, R)	51.0%	50.0%
	Project 2 (SPSS, Excel, Statistica)	51.0%	50.0%

Recommended reading	Basic literature	1. R Core Team, <i>An Introduction to R</i>, 2021, https://cran.r-project.org/doc/manuals/r-release/R-intro.html 2. H. Wickham, G. Grolemund, <i>R for Data Science: Import, Tidy, Transform, Visualize, and Model Data</i>, O'Reilly Media, Sebastopol, CA 2017, https://r4ds.had.co.nz/ 3. K. Grzeszkiewicz-Radulska, J. Wiktorowicz, M.M. Grzelak, <i>Analiza statystyczna z IBM SPSS Statistics</i>, Wydawnictwo UŁ, Łódź 2020, https://wydawnictwo.uni.lodz.pl/wp-content/uploads/2021/01/Wiktorowicz-i-in._Analiza-statystyczna-.pdf 4. W. McKinney, <i>Python w analizie danych. Przetwarzanie danych za pomocą pakietów Pandas i NumPy oraz środowiska IPython</i>. Wydanie II, Helion, Gliwice, 2018 5. M. Rabiej, <i>Analizy statystyczne z programami Statistica i Excel</i>, Helion, Gliwice, 2018
	Supplementary literature	1. E. Matthes, <i>Python. Instrukcje dla programisty</i>. Wydanie II, Helion, Gliwice, 2019, str. 31-215
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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