

Subject card

Subject name and code	Analytical Software and Data Visualization, PG_00156748						
Field of study	Oprogramowanie analityczne i wizualizacja danych - B						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study 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		30.0		70.0	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_U05] The student can make a statistical description of advanced economic categories, formulate and verify simple hypotheses on their formation.	The student for any series is able to calculate and interpret descriptive statistics, make hypotheses and verify them with appropriate tests.	[SU2] prezentacja/projekt/referat/raport
	[liEL3_K02] The student can communicate with the public on computer science and econometrics topics in and outside the workplace, communicate his knowledge and share his skills through various media.	Through various means, he communicates in an understandable way with those around him, passing on knowledge and demonstrating his skills.	[SK1] wypowiedź ustna/rozmowa/diskusja [SK8] obserwacja samodzielnej lub zespołowej pracy studenta
	[liEL3_K01] The student understands the need to constantly supplement and deepen acquired knowledge; is open to new ideas and teaching methods.	Constantly supplements and deepens the acquired knowledge of economic phenomena. Recognises the need for change in relation to the changing socio-economic environment.	[SK6] demonstracja umiejętności praktycznych
	[liEL3_W05] The student has advanced knowledge of the sources of socio-economic data, their databases and ways of creating them.	The student for any series is able to calculate and interpret descriptive statistics, make hypotheses and verify them with appropriate tests.	[SW2] prezentacja/projekt/referat/raport
	[liEL3_U07] The student can build formal models of complex economic phenomena and processes, estimate them, carry out their verification, and apply them to modelling, forecasting and optimization of the resources of low-complexity economic institutions, their structure and the course of processes in them.	The student is able to build and estimate complex models of economic processes, and is able to assess their quality and usefulness from the point of view of forecasting and optimisation of economic processes.	[SU2] prezentacja/projekt/referat/raport
	[liEL3_W04] The student has advanced knowledge of mathematical, statistical, econometric and computer methods of obtaining, processing and analysing data depicting the functioning and development of the national economy and its elements, as well as the phenomena and processes occurring in their environment.	He has knowledge of advanced quantitative methods, which he knows how to use to analyse economic functioning and growth in a variety of interrelated areas.	[SW2] prezentacja/projekt/referat/raport
	[liEL3_W01] The student has advanced knowledge of the place of social sciences in the system of sciences, their nature, methodology and connections with other sciences.	The student has an in-depth knowledge of the role and importance of the social sciences, their specificities and links with other fields of knowledge.	[SW2] prezentacja/projekt/referat/raport

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 analysis 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	A. Formal requirements: descriptive statistics, mathematical statistics. B. Prerequisites: basic computer skills and ability to use the Internet.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project 2 (SPSS, Excel, Statistica)	51.0%	50.0%
	Project 1 (Python, R)	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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