

Subject card

Subject name and code	Big Data, PG_00157089						
Field of study	Informatics and Econometrics						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study 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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Statistics -> Faculty of Management -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Krzysztof Najman				
	Teachers		dr hab. Krzysztof Najman				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	8.0	0.0	0.0	0.0	0.0	8
	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	8		15.0		30.0	53
Subject objectives	Familiarizing students with theoretical and practical aspects of building and using Big Data systems.Familiarizing students with Big Data data sources, Big Data analysis process, Big Data system functioning architecture.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[liEMU2_U02] The student is able to proficiently acquire detailed information about economic processes and phenomena through direct observation, planned experimentation or database queries, as well as collect and process it using modern information technology tools.	Is able to obtain data on economic processes and phenomena using Big Data methods.	[SU1] oral statement/conversation/discussion [SU3] text preparation/written work
	[liEMU2_K02] The student can communicate freely with the public on specialised topics in the field of computer science and econometrics in and outside the workplace, communicate his knowledge and share his skills through various media. Culturally participates in discussions, is not afraid to ask questions and knows how to give constructive criticism.	Able to discuss, communicate and share knowledge in the field of Big Data.	[SK1] oral statement/conversation/discussion
	[liEMU2_W02] The student has an in-depth knowledge of economic structures and institutions, the processes taking place in them, the connections between them and their dynamics, and has an in-depth knowledge of the phenomena and processes taking place in their environment.	Has in-depth knowledge of structures and institutions, as well as the connections between them in the field of Big Data analysis.	[SW1] oral statement/conversation/discussion [SW3] text preparation/written work
	[liEMU2_K03] The student is able to communicate freely with the public inside and outside the workplace, transfer his knowledge and share his skills through various media.	Is able to communicate and transfer his/her knowledge in the field of Big Data analysis.	[SK1] oral statement/conversation/discussion
	[liEMU2_K01] The student understands the need for continuous completion and deepening of acquired knowledge. The student inspires and organizes others' learning processes.	Understands the need to constantly update knowledge in the field of Big Data.	[SK1] oral statement/conversation/discussion
	[liEMU2_W04] The student has an in-depth knowledge of advanced mathematical, statistical, econometric and IT methods that enable the acquisition, processing and analysis of data reflecting the functioning and growth of the national economy and its components, as well as the phenomena and processes occurring in their environment.	Has in-depth knowledge of advanced analytical methods related to Big Data.	[SW1] oral statement/conversation/discussion [SW3] text preparation/written work
	[liEMU2_W05] The student has an in-depth knowledge of socio-economic data sources, their databases and how to create them.	Has in-depth knowledge of data sources used in Big Data analysis.	[SW1] oral statement/conversation/discussion [SW3] text preparation/written work
	[liEMU2_W07] The student has an extended and established knowledge of ethical norms applicable to business, good practices for its conduct and legal regulations for the protection of intellectual property. The student has an extended knowledge of the risks and responsibilities associated with the computerization of business processes. The student knows the principles of netiquette.	Has extensive and well-established knowledge of ethical standards, risks and responsibilities related to Big Data analysis.	[SW1] oral statement/conversation/discussion [SW3] text preparation/written work

	Course outcome	Subject outcome	Method of verification
	[liEMU2_U09] The student has an in-depth ability to prepare written works, oral speeches and multimedia presentations on the functioning and growth of the national economy and its components, the course of complex economic phenomena and processes, the acquisition of data about them, their collection, processing and analysis with the help of modern mathematical, statistical, econometric and IT tools, as well as their use in modeling, forecasting and optimization.	Has advanced skills in preparing written works on Big Data analysis.	[SU3] text preparation/written work
Subject contents	The origin of the big data phenomenon as an element of evolution: existing data sources, possibilities of their collection, storage and analysis: Evolution and nature of basic data sources in social research (quantitative explosion): from the census to the data stream of social portals. Evolution of data collection and storage methods (price implosion): hardware and software, from mechanical calculators to modern computing clusters. Evolution of data analysis methods: statistics, data exploration, data mining, KDD (Knowledge Discovery and Databases), big data. Definition, essence and purpose of big data data analysis. Definition of the 3V and 6V systems. Characteristics (stages) of the big data analysis process (the cycle of big data management: capture, integrate, organize, analyze, act). Functional architecture of the big data system (the big data architecture). Technical and software aspects. Big Data NFRs (Non-Functional requirements): reliability, scalability, operability, maintainability, availability, security. Characteristics of data in big data analysis: Data sources for big data analysis. Characteristics of data streams originating from interactions: interpersonal, inter-device, human-machine. Structure and properties of data in big data analysis: clear data, dirty data, dark data. The essence of data analysis: on time, off time, real time, near real time, any time. The idea of analyzing unstructured data with infinite volume (NoSQL). Methods of big data analysis (big data analytics): natural language processing, text mining, opinion mining (sentiment analysis), search and sort algorithms, graph and network, cluster analysis, artificial intelligence and machine learning, predictive models, visualization. Ethical and legal aspects of big data analysis: data privacy, use of public domain data, integration of personal data from multiple sources. The most important sources of value (Value) of big data analysis for the investor/user. A model for implementing a big data system in an enterprise. Examples of big data systems: case study: applications in the public sector: projects and implementations of the Central Statistical Office, estimating inflation, monitoring and optimizing road traffic in bottlenecks, applications in the financial sector: algorithmic investments, estimating creditworthiness based on data from social media, selected case studies.		
Prerequisites and co-requisites	Basic knowledge of statistics and econometrics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final essay	51.0%	100.0%
Recommended reading	Basic literature	Victor Meyer-Schonberger, Kenneth Cukier, Big data. Rewolucja, która zmieni nasze myślenie, pracę i życie. MT Biznes, 2014 Cathy O'Neil, Brań matematycznej zagłady, PWN, 2017 C. Kurz, F. Rieger, Pożeracze danych, MUZA, 2013.	
	Supplementary literature	J.Angwin, Społeczeństwo nadzorowane, PWN, 2020	
	eResources addresses		
	Example issues/ example questions/ tasks being completed		
Work placement	Not applicable		

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