



## Subject card

Subject name and code	Acquisition, collection and processing of biomedical data, PG_00053319						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-cycle 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	Full-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	general academic profile		Assessment form		exam		
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Marcin Gruszecki				
	Teachers		mgr inż. Kamil Osiński dr hab. Marcin Gruszecki dr inż. Paweł Syty dr inż. Tomasz Kocejko dr inż. Patryk Jasik				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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		3.0		17.0	50
Subject objectives	The main aim of the course is introduction the students to problems of acquisition, gathering and data processing of biomedical data.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Students are able to apply theoretical knowledge to specific experiments or device design.	[SU1] Assessment of task fulfilment
	[K7_W53] Knows and understands, to an increased extent, selected aspects of biomedical diagnostics.	Students are able to apply the acquired knowledge to the interpretation of the obtained results.	[SW1] Assessment of factual knowledge
	[K7_W03] Knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum.	Students are able to apply theoretical knowledge to solve specific problems.	[SW1] Assessment of factual knowledge
	[K7_U07] can apply advanced methods of process and function support, specific to the field of study	Students can practically use advanced methods of supporting processes.	[SU1] Assessment of task fulfilment

Subject contents	Introduction		
	Types of biomedical data (numerical data, signals, images)		
	Sources and methods of obtaining biomedical data		
	Purposes of collecting biomedical data		
	Uncertainties and errors in the process of collecting biomedical data		
	Quality of biomedical data		
	Examples of biomedical data processing		
	Obtaining consent to collect biomedical data (PG and GUMed ethics committee)		
	Control of single variables and study of their distribution		
	Study of the correlation between variables		
	Data autoscaling and principal component analysis Building a population for biomedical research. Structures of different populations.		
	Sources of biological material (e.g. blood, serum, fibroblasts).		
	DNA, RNA, miRNA, fcDNA as a source of information about the patient.		
	The methods of storing the material		
	Examples of laboratory determinations, clinical data, molecular determinations.		
Processing and preparation of medical images (and other data) for machine learning purposes			
Prerequisites and co-requisites	Basics of physics and programming		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		60.0%	60.0%
		60.0%	40.0%
Recommended reading	Basic literature	R. Tadeusiewicz, Informatyka medyczna, Uniwersytet Marii Curie-Skłodowskiej w Lublinie, Lublin 2011	
		A. Gajewski, Błdy pomiarów, Akademia Ekonomiczna w Krakowie, Kraków 1996	
		A. Stanis, Przystpny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny, TOM I	

	Supplementary literature	M. Michalski, W. Koba, T. Nieczkowski, Ł. Ryfa, Identyfikacja, analiza i klasyfikacja typów danych medycznych oraz określenie modeli ich gromadzenia i udostępniania na potrzeby leczenia oraz prowadzenia polityki ochrony zdrowia z uwzględnieniem aspektów syntaktycznych i semantycznych oraz ilościowych tych danych w kontekście dowiadczekrajowych i międzynarodowych, Centrum Systemów Informacyjnych Ochrony Zdrowia, 2010
	eResources addresses	Adresy na platformie eNauczanie: Pozyskiwanie, gromadzenie i przetwarzanie danych biomedycznych - 2023 - Moodle ID: 28932 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28932">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28932</a>
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	