



## 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	October 2022	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	2	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	dr hab. Marcin Gruszecki mgr inż. Kamil Osiński					
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_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_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		
	[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_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		

Subject contents	<p>Introduction</p> <p>Types of biomedical data (numerical data, signals, images)</p> <p>Sources and methods of obtaining biomedical data</p> <p>Purposes of collecting biomedical data</p> <p>Uncertainties and errors in the process of collecting biomedical data</p> <p>Quality of biomedical data</p> <p>Examples of biomedical data processing</p> <p>Obtaining consent to collect biomedical data (PG and GUMed ethics committee)</p> <p>Control of single variables and study of their distribution</p> <p>Study of the correlation between variables</p> <p>Data autoscaling and principal component analysis Building a population for biomedical research. Structures of different populations.</p> <p>Sources of biological material (e.g. blood, serum, fibroblasts).</p> <p>DNA, RNA, miRNA, fcDNA as a source of information about the patient.</p> <p>The methods of storing the material</p> <p>Examples of laboratory determinations, clinical data, molecular determinations.</p> <p>Processing and preparation of medical images (and other data) for machine learning purposes</p>											
Prerequisites and co-requisites	Basics of physics and programming											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 1532 794 1570">Subject passing criteria</th> <th data-bbox="799 1532 1141 1570">Passing threshold</th> <th data-bbox="1145 1532 1482 1570">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1576 794 1592"></td> <td data-bbox="799 1576 1141 1592">60.0%</td> <td data-bbox="1145 1576 1482 1592">60.0%</td> </tr> <tr> <td data-bbox="453 1599 794 1615"></td> <td data-bbox="799 1599 1141 1615">60.0%</td> <td data-bbox="1145 1599 1482 1615">40.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		60.0%	60.0%		60.0%	40.0%
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Recommended reading	Basic literature	<p>R. Tadeusiewicz, Informatyka medyczna, Uniwersytet Marii Curie-Skłodowskiej w Lublinie, Lublin 2011</p> <p>A. Gajewski, Błędy pomiarów, Akademia Ekonomiczna w Krakowie, Kraków 1996</p> <p>A. Stanisław, Przystępny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny, TOM I</p>										

	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	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	