GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Biosignal measurements and processing, PG_00053359		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2023/2024
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	3.0
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	prof. dr hab. inż. Jerzy Wtorek	
	Teachers	prof. dr hab. inż. Jerzy Wtorek dr Tomasz Neumann dr inż. Adam Bujnowski Ignacy Rogoń	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45	4.0	26.0	75

Subject objectives	To familiarize students with the methods of measurement and processing on selected examples of biosignals.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] Knows and understands, to an increased extent, mathematics to the extent necessary to formulate and solve complex issues related to the field of study.	The student is able to describe, using a mathematical language, a selected problem in the field of biosignals in terms of both measurement and processing, including extraction of features and classification.	[SW1] Assessment of factual knowledge
[K7_W05] Knows and understands, to an increased extent, methods of process and function support, specific to the field of study.	Student will present methods and related software for advanced biosignal analysis.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U02] can perform tasks related to the field of study as well as formulate and solve problems applying recent knowledge of physics and other areas of science	The student will design and implement a solution that uses processing methods to automate the analysis of biosignals to achieve a specific goal.	[SU1] Assessment of task fulfilment
[K7_W02] Knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	The student knows and understands the basics of physiology and pathology enabling the assignment and use of selected laws and physical phenomena to describe selected biosignals and to understand the relationships between them.	[SW1] Assessment of factual knowledge
[K7_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study by:n- appropriate selection of source information and its critical analysis, synthesis, creative interpretation and presentation,n- application of appropriate methods and toolsn	The student will design and implement a procedure to support advanced methods of biosignal analysis.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Basic concepts, Classification of signals, definition of biosignals. Metrological problems. Electrocardiography - signal modeling. Custom electrocardiography. Derivative electrocardiographic signals. Electrocardiography - methods of processing, extraction and classification. Electrocardiography - new applications. Electromyography - signal source, mathematical model. Electromyography - methods of processing, analysis and classification. Electromyography - applications (prosthetics, control, assessment of fatigue, gait ...)

Prerequisites and co-requisites

Knowledge of Anatomy, Physics, Mathematics at the 1st degree of engineering studies

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture	60.0%	40.0%
Laboratory	60.0%	60.0%

Recommended reading

Basic literature	Gari D. Clifford, Francisco Azuaje, Patrick E. McSharry, Advanced Methods and Tools for ECG Data Analysis, artechhouse.com
Supplementary literature	Leif Sornmo, Pablo Laguna, BIOELECTRICAL SIGNAL PROCESSING IN CARDIAC AND NEUROLOGICAL APPLICATIONS, Elsevier ACADEMIC PRESS
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Design a filter to remove mains interference from the EKG/EMG signal

Work placement

Not applicable