GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Processing of digital signals and images, PG_00057482		
Field of study	Mechanical and Medical 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	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Zakład Mechatroniki -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Galewski	
	Teachers	dr inż. Yurii Tsybrii	
		dr hab. inż. Marek Galewski	

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	Teaching students essential elements of digital sinal (ADC, DAC, filtration, spectral analysius) and image processing (point, context and morphological transformations)

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U12] He/she uses augmented knowledge referring to the medical physics and imagine diagnoses in the scope of the field of study of mechanical-medical engineering	Stuent performs basic image transformations needed for further analysis	[SU1] Assessment of task fulfilment
	[K7_W01] He/she has broad knowledge referring to the high level math to solve numerical problems and tasks related to planning and to work out results of research in the scope of the field of study of mechanical-medical engineering	Student knows sampling theorem and Fourier transform	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K7_W02] He/she has in-depth knowledge related to the medical physics and imagine diagnoses in medicine	Student descibes essential methos of image transformations and analysis	[SW3] Assessment of knowledge contained in written work and projects
	[K7_U05] He/she can use measurement technique and methods to assess errors of measurement. He/she can plan and conduct research (also numerical ones) and interprets obtained results and draw conclusions	Stuent records signals and perform basic analysis	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment

Subject contents	• Signal Processing
	
	     • Signals classification
	     • Analog to digital conversion
	     • Digital to analog conversion
	     • Besic signal parameters
	     • Fourier transform and signal spectrum
	     • FFT, IFFT
	     • Frequency leakage, time windows
	     • Sampling theorem
	• Image processing
	
	     • Digital image and it's representation
	     • Geometrical transforms
	     • Point transfrorms
	     • Context transforms
	     • Spectral transforms
	     • Morphological transforms
	     • Image analysis
	• Artifficial Intelligence in signal and image processing

Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
2 written tests	52.0%	70.0%
Practical lab. exercises	52.0%	30.0%

Recommended reading

Basic literature	Lyons S.G, Understanding Digital Signal Processing, 2010 Gonzalez R., Woods R. Digital Image Processing, Person, 2018
Supplementary literature	additional materials given during lectrue
eResources addresses	Adresy na platformie eNauczanie: Cyfrowe Przetwarzanie Sygnałów i Obrazów, W/L, IMM, II st., sem. 01, letni 2023/24 (PG_00057482) - Moodle ID: 34737 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34737

Example issues/ example questions/ tasks being completed	Appropriate list of test subjects and questions will be given to the student a few weeks before the test.
Work placement	Not applicable