GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of Digital Signal Processing, PG_00055443						
Field of study	Mechatronics						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2023/2024		
Education level	first-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	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	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 hab. inż. Marek Galewski dr inż. Natalia Stawicka-Morawska				
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		1.0		19.0	50
Subject objectives	Presenting basics of digital signal and image processing						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U04] is able to utilse known methods and mathematical models as well as analog and digital measurement methods for analysing and assesement of stationary continous and discrete mechatronics systems and processes	Student performs basic signal processing (using appropriate tools). Student avoids frequency leakage and aliasing. Student interprets signal spectrum plot.	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K6_W06] has organized knowledge in terms of informatic and methods of analog and digital signal processing	Student develops simple programms performing basic digital signal processing	[SW3] Assessment of knowledge contained in written work and projects
[K6_W01] has knowledge in terms of mathematics that include vector and matrix calculus, analytical geometry, mathematical analysis (including ordinary and partial differential equations) and elements of discrete and applied mathematics, including mathematical and numerical methods essential to: 1) description and analysis od stationary, continuous and discrete mechatronics systems as well as basic physical phenomena that occur there; 2) description and analysis od programmable mechatronic systems; 3) description and analysis for signal processing; 4) synthesis of mechatronics elements and systems	Student understands basic, analytical dependencies lying behind signal processing, especially Fourier transform and sampling theory	[SW1] Assessment of factual knowledge
[K6_W07] has a basic knowledge in terms of metrology; knows and understands methods for measurement and processing of basic quantities that characterize mechatronic systems; knows computational methods and IT tools essential for analyses of experimental results	Student corectly selects paremeters of ADC channel	[SW1] Assessment of factual knowledge

Subject contents

Signal prcessing: A/C and D/A conversions, basic signal parameters, Fourier transformation and signal spectrum, FFT, IFFT, frequency leak, time windows, theory of sampling, aliasing Image processing: Creation and representation of digital image, geometrical transformations, point transfomations - contextual and non-contextual, spectral transformations, morfological transformations, basic image recognition techniques, Artificial neural Networks in image processing

Prerequisites and co-requisites

Knolwedge from Mathematics and Metrology and measurement systems courses

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Practical exercises	52.0%	20.0%
Midterm colloquium	52.0%	80.0%

Recommended reading

Basic literature	1. Lecture materials published at the web site of the chair of Mechanics and Mechatronics 2. Laboratory exercises handbook
Supplementary literature	1. Proakis J.G, Manolakis D.G. Digital Signal Processing, 2021 2. Jayden H. Begginers guid to computer vision: Leverage Deep Learning To Create Powerful Image Processing Apps, 2021 3. Tłaczała W.: Środowisko LabVIEW w eksperymencie wspomaganym komputerowo. WNT, Warszawa 2005
eResources addresses	

Example issues/ example questions/ tasks being completed

Students recive a list of potential questions a few weeks before the colloquium

Work placement

Not applicable