GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of Digital Signal Processing, PG_00060474		
Field of study	Mechatronics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
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	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		

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	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_W07] has organised knowledge in the field of metrology; knows and understands methods for measurement and processing of basic quantities that characterize mechatronic systems; knows basic methods of analogue and digital signals processing and computational methods and IT tools essential for analyses of experimental results	Student corectly selects paremeters of ADC channel	[SW1] Assessment of factual knowledge
[K6_W06] has organised knowledge in the field of informatic that includes architecture of computer systems, programming of computers and embedded systems and elements of software engineering	Student develops simple programs performing basic digital signal processing	[SW3] Assessment of knowledge contained in written work and projects
[K6_W01] has knowledge in the field 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_U04] is able to utilise known methods and mathematical models as well as analogue and digital measurement methods for analysing and assessment of stationary continuous 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

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 noncontextual,
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 / projects	52.0%	30.0%
Colloquiums	52.0%	70.0%

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	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

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

Work placement

Not applicable