GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Digital Signal Processing, PG_00038187		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	February 2022	Academic year of realisation of subject	2021/2022
Education level	second-cycle studies	Subject group	
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	assessment
Conducting unit	Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Ariel Dzwonkowski	
	Teachers	dr inż. Ariel Dzwonkowski dr hab. inż. Dariusz Świsulski	

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	5.0	25.0	75

Subject objectives

The aim of the course is to introduce students to the subject of digital signal processing.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U07	The student is able to evaluate the parameters of the signals. The student knows how to apply algorithms of frequency analysis. The student is able to design filters and verify their correct operation. The student is able to analyze multivariate signals.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
K7_W03	The student knows the types of signals and their characteristics. The student knows the methods of frequency analysis of signals. The student knows the types of filters and the methods of their design. The student knows the algorithms for processing multidimensional signals.	[SW1] Assessment of factual knowledge

Subject contents

LECTURE

The types of signals. Processing A / D and D / A circuits sample & hold S & H. Aliasing. Continuous and Discrete Fourier Transform. Correlation and autocorrelation signals. Filtration signals. Filters of finite and infinite impulse response - how it works, musical, design. Hilbert transform. STFT and wavelet analysis, the basis and application. Two-dimensional signal processing. Examples of applications of digital signal processing.

LABORATORY

Introduction to Digital Signal Processing in LabVIEW. Sampling, quantization, signal reconstruction, aliasing, spectral analysis. Filters of finite and infinite impulse response. Adaptive filtering. Time-frequency analysis (STFT, wavelet analysis).

Prerequisites and co-requisites

Basic knowledge of mathematical analysis.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory - Practical exercise	60.0%	40.0%
Lecture - midterm colloquium	60.0%	60.0%

Recommended reading	Basic literature	1. Zieliński T. P.: Cyfrowe przetwarzanie sygnałów. Od teorii do zastosowań. Wydawnictwa Komunikacji i Łączności. Warszawa 2005. 2. Marven C., Ewers G.: Zarys cyfrowego przetwarzania sygnałów. Wydawnictwa Komunikacji i Łączności. Warszawa 1999. 3. Lyons R. G.: Wprowadzenie do cyfrowego przetwarzania sygnałów. Wydawnictwa Komunikacji i Łączności. Warszawa 2006.
	Supplementary literature	1. Kehtarnavaz N., Kim N.: Digital Signal Processing. System-Level Design Using LabVIEW. Elsevier 2005. 2. Clark C. L.: Digital Signal Processing and Digital Communications. McGraw-Hill 2005. 3. Haykin S.: Communication Systems. John Wiley & Sons 2000. 4. Świsulski D.: Komputerowa technika pomiarowa. Oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW. Agenda Wydawnicza PAK, Warszawa 2005.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. How are they made and what they are sample & hold circuits? 2. What is aliasing? 3. Types of digital filters. 4 What is the Fourier transform for discrete signals? 5. What is the STFT analysis? 6. Describe the properties of parametric Kaiser window. 7. Introduce an example of practical use of digital signal processing.	
Work placement	Not applicable	