GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Advanced programming in LabView, PG_00062748		
Field of study	Technologies for Industry 5.0		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2027/2028
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	4	Language of instruction	Polish Polish
Semester of study	7	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Chmielewski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	0.0	30.0	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	2.0	18.0	50

Subject objectives

The purpose of the course is to prepare students for the effective use of the LabVIEW environment used as a tool for advanced digital signal processing. The subject is intended to encourage extensive use of the environment, especially in the preparation of engineering and master's theses in the field of advanced numerical processing of measurement signals.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K03] effectively, clearly and unambiguously conveys information, describes activities and communicates their results and opinions of a specialist engineer using appropriate communication methods and tools	The student is skilled in designing computational algorithms as well as their direct implementation in a programming environment. Can use tools from the Advanced Signal Analazer package from the LabVIEW package. Can effectively scale models of digital computational algorithms.	[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice
[K6_U01] applies knowledge of mathematics, physics, chemistry, IT tools and other engineering disciplines to solve theoretical, engineering and technological problems	The student is able to independently, on the basis of his knowledge, construct an algorithm and apply the knowledge of technical sciences to solve any scientific problem. Applies in an optimized way the rules of physics mathematics	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W01] demonstrates knowledge and understanding of mathematics, physics, chemistry and IT tools at the level necessary to formulate and solve typical engineering and technological problems	The student is able to independently, on the basis of his knowledge, create software to solve a problem related to the automation of the measurement process, the analysis of measurement data, a problem in any technical tasks.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

The content of the course is the comprehensive use of the LabVIEW package in the field of wide-area digital signal analysis. Digital signal filtering methods, effective interpolation and extrapolation techniques will be presented and tested. Activities in mathematical processing of digital signals including integration and differentiation procedures, filtering using Fourier transform and Wavelet analysis, including in the time domain. Techniques for parameterizing noise signals will be presented. Techniques for reporting computational results in LabVIEW will be presented.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Completed course: Programowanie w języku LabView</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Final project</td><td>100.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Online resources provided by Natinal Instruments among others:

https://learn.ni.com/learn/article/getting-started-with-fpga

https://www.ni.com/docs/en-US/bundle/labview-advanced-signal-processing-toolkit-api-ref/page/lvasptconcepts/aspt_default_page.html

Digital Signal Processing and Spectral Analysis for Scientists Springer International Publishing AG, marzec 2019</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Not Required</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Discrete digital signal analysis

Fast Fourier Transform

Time domain Fourier transform

Wavelet analysis

Digital interpolation and extrapolation</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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