



Subject card

Subject name and code	Numerical methods in the LabVIEW environment, PG_00071204						
Field of study	Nanotechnology						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
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	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marek Chmielewski				
	Teachers		dr inż. Marek Chmielewski				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	30.0	0.0	0.0	40
	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	40	1.0		9.0	50	
Subject objectives	The aim of the course is to prepare students to effectively use LabVIEW environment used as a tool for advanced digital signal processing						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W05] has in-depth knowledge of mathematical, numerical, and simulation methods - both classical and quantum - used in the modeling of nanostructures	The student has the skills to design computational algorithms and implement them directly in a programming environment. They are able to use tools from the Advanced Signal Analyzer package from LabVIEW. They are able to effectively scale models of digital computational algorithms.			[SW3] Assessment of knowledge contained in written work and projects		
[K7_U03] has enhanced abilities of using advanced specialist software packages	The student applies simple as well as advanced algorithms for digital signal processing. He/she learns the capabilities of software that enables the application of such algorithms. The student can effectively use ready software libraries. The student can effectively adapt working programs to specific solutions.			[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task			
Subject contents	Course content – lecture Comprehensive use of the LabVIEW package in the field of broadly understood digital signal analysis. Methods of digital signal filtering, effective interpolation and extrapolation techniques. Activities in the field of mathematical processing of digital signals, including integration and differentiation procedures, filtering using Fourier transform and Falk analysis, also in the time domain. Techniques for parameterizing noise signals will be presented. Preparation for laboratory tasks.						
	Course content – laboratory For the purposes of creating advanced analytical software in the LabVIEW environment, raw measurement signals obtained from broadband and multidirectional measurements of the classic Barkhausen effect will be used. The task of the laboratory teams will be to remove signal interference as effectively as possible and accurately determine the desired quantifiers.						

Prerequisites and co-requisites	Basic knowledge of LabVIEW programming environment		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Assessment of laboratory tasks	80.0%	100.0%
Recommended reading	Basic literature	Website www.NI.com "Introduction to Digital Signal Processing" Author: Robert Meddins;Elsevier LTD, Oxford 2000	
	Supplementary literature	non	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Applications of FFT analysis for removing noise components from the measured signal. Use of SFFT techniques for parameterizing complex measurement signals. Difference in the use of RMS and DC signal processing.		
Practical activities within the subject	Not applicable		

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