



Subject card

Subject name and code	Processing of digital signals and images, PG_00057482						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
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	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		dr hab. inż. Marek Galewski				
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		3.0		17.0	50
Subject objectives	Teaching students essential elements of digital sinal (ADC, DAC, filtration, spectral analysius) and image processing (point, context and morphological transformations)						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U05] He/she can use measurement technique and methods to assess errors of measurement. He/she can plan and conduct research (also numerical ones) and interprets obtained results and draw conclusions		Stuent records signals and perform basic analysis		[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W02] He/she has in-depth knowledge related to the medical physics and imagine diagnoses in medicine		Student descibes essential methos of image transformations and analysis		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W01] He/she has broad knowledge referring to the high level math to solve numerical problems and tasks related to planning and to work out results of research in the scope of the field of study of mechanical-medical engineering		Student knows sampling theorem and Fourier transform		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K7_U12] He/she uses augmented knowledge referring to the medical physics and imagine diagnoses in the scope of the field of study of mechanical-medical engineering		Stuent performs basic image transformations needed for further analysis		[SU1] Assessment of task fulfilment		

Subject contents	<ul style="list-style-type: none">• Signal Processing<ul style="list-style-type: none">• Signals classification• Analog to digital conversion• Digital to analog conversion• Basic signal parameters• Fourier transform and signal spectrum• FFT, IFFT• Frequency leakage, time windows• Sampling theorem• Image processing<ul style="list-style-type: none">• Digital image and it's representation• Geometrical transforms• Point transforms• Context transforms• Spectral transforms• Morphological transforms• Image analysis• Artificial Intelligence in signal and image processing											
Prerequisites and co-requisites												
Assessment methods and criteria	<table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Practical lab. exercises</td><td>52.0%</td><td>30.0%</td></tr><tr><td>2 written tests</td><td>52.0%</td><td>70.0%</td></tr></table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Practical lab. exercises	52.0%	30.0%	2 written tests	52.0%	70.0%
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Recommended reading	<table><tr><td>Basic literature</td><td>Lyons S.G, Understanding Digital Signal Processing, 2010 Gonzalez R., Woods R. Digital Image Processing, Person, 2018</td></tr><tr><td>Supplementary literature</td><td>additional materials given during lectrue</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr></table>			Basic literature	Lyons S.G, Understanding Digital Signal Processing, 2010 Gonzalez R., Woods R. Digital Image Processing, Person, 2018	Supplementary literature	additional materials given during lectrue	eResources addresses	Adresy na platformie eNauczanie:			
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Example issues/ example questions/ tasks being completed	Appropriate list of test subjects and questions will be given to the student a few weeks before the test.											
Work placement	Not applicable											