



## Subject card

Subject name and code	Control Systems with Signal Processors, PG_00044091							
Field of study	Electrical Engineering							
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025			
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	2	ECTS credits			2.0			
Learning profile	general academic profile	Assessment form			assessment			
Conducting unit	Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering							
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Filip Wilczyński					
	Teachers							
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							
Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=17244">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=17244</a>								
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		5.0		15.0		50
Subject objectives	The main aim of the subject is to introduce implementation methods of control systems using current microprocessor systems.							
Learning outcomes	Course outcome	Subject outcome			Method of verification			
	K7_U03	student can propose a control system and can use a reference manual of the implemented microprocessor system			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools			
	K7_W01	student can prepare a mathematical model of the plant and can numerically solve differential equation systems			[SW1] Assessment of factual knowledge			
	K7_U02	student can explain proposed control system and present the results			[SU5] Assessment of ability to present the results of task			
K7_W02	student can implement a control system using an analog-digital converter to measure plant's outputs			[SW3] Assessment of knowledge contained in written work and projects				
Subject contents	State equations, PID regulators, cascade control, poles placement, numerical methods for differential equations, control systems implementation on a microcontroller, usage of DSP instructions/functions							
Prerequisites and co-requisites	Essentials of automatic control and electrical engineering, ability to write simple code in C language.							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade			
	Laboratories		60.0%		50.0%			
	Lectures		60.0%		50.0%			

Recommended reading	Basic literature	<p>Nise, N. S. (2020). <i>Control Systems Engineering</i> (8th ed.). Wiley.</p> <p>Holmes, Mark H., <i>Introduction to Numerical Methods in Differential Equations</i> (2021). Springer.</p> <p>Ibrahim, D. (2013). <i>Practical Digital Signal Processing using Microcontrollers</i>. Elektor Verlag.</p>
	Supplementary literature	<p>Grover, D., &amp; Deller, J. R. (1998). <i>Digital Signal Processing and the Microcontroller</i>. Prentice Hall.</p> <p>Nagrath, I. J., &amp; Gopal, M. (2021). <i>Control Systems Engineering (Third Edition)</i> (3rd ed.). New Age International Publishers.</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>Prepare a state-space representation of a water heater.</p> <p>Propose and implement a control system on a microcontroller.</p>	
Work placement	Not applicable	