



Subject card

Subject name and code	Computer Controlled Systems and Decision Support, PG_00038317						
Field of study	KOMPUTEROWE SYSTEMY STEROWANIA I WSPOMAGANIA DECYZJI						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2025/2026		
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		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Intelligent and Decision Support Systems -> Faculty of Electrical and Control Engineering -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Jarosław Tarnawski				
	Teachers		dr inż. Jarosław Tarnawski				
			mgr inż. Kajetan Zielonacki				
			mgr inż. Tomasz Ujazdowski				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	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		2.0		53.0	100
Subject objectives	The aim of this course is to provide students with knowledge of the importance of decision support systems in computer-aided control systems and practical skills in building such systems. Students will learn how to incorporate optimization methods into control systems, initially for tuning controllers and then for decision-making systems. Students will build a computer-aided control system for a simulated industrial facility and supplement it with a decision support module for the operator using a user interface.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U10] is able to apply the known mathematical tools and methods and computer techniques to analyse and evaluate automation and robotics components, devices, systems and systems	Tunes regulators and supports operator and managerial decisions using optimization techniques	[SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania
	[K7_W09] has knowledge of typical security systems in industrial settings, knows methods of identification and design of protection systems in accordance with the methodology of functional security, has knowledge of information security	Builds a control and decision support system that takes into account extensive safety procedures	[SW1] Ocena wiedzy faktograficznej
	[K7_K02] can interact and work in a group assuming various roles and identify priorities for the achievement of a specific task	Carries out diverse tasks in a group, assuming various roles: managerial, executive, evaluative	[SK1] Ocena umiejętności pracy w grupie
	[K7_W02] has a structured knowledge of the application of information systems to improve the reliability, efficiency, speed and mobility of control and management systems	It uses advanced IT tools to enhance the functionality of the computer control system with a decision support module.	[SW1] Ocena wiedzy faktograficznej
	[K7_W06] has an extended knowledge of the design of automation components and devices, control and decision support systems control and decision support systems and complex mechatronic systems	Designs and implements a computer control system for selected industrial processes	[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym
	[K7_U07] is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems in the field of automation and robotics	Defines and solves optimization tasks	[SU4] Ocena umiejętności korzystania z metod i narzędzi

Subject contents	Course content – lecture Computer Control and Decision Support Systems (CCDsDS)		
	Technical and Historical Overview		
	Implementation of Decision Support Systems (CDS) Heuristics Statistics Optimization		
	Computer control systems and the role of decision support in these structures. Issues of direct, superior, optimizing, and management control		
	Hardware implementation and requirements for devices operating in these layers		
	Off-line and online decision support methods		
	Optimization methods useful in DSS		
	DSS implementation in industrial automation application		
	Course content – laboratory Tuning Controllers Using Optimization		
	Implementing Optimization in PLCs		
Prerequisites and co-requisites	Building a Decision Support System for Offline Tasks - Determining Control Trajectories on the Control Horizon		
	Building a Decision Support System for Online Tasks - Supporting the Currently Executed Control Process		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Implementation of laboratory modules	50.0%	100.0%
Recommended reading	Basic literature	Efraim Turban et al. Decision Support and Business Intelligence Systems	
		Daniel J. Power Decision Support Systems: Concepts and Resources for Managers	
		George M. Marakas Decision Support Systems in the 21st Century	
	Supplementary literature	Nishu Gupta, Jose David Diaz Roman (red.) Decision Support Systems for Industrial and Scientific Applications	
		S. Christian Albright VBA for Modelers: Developing Decision Support Systems with Excel	
	eResources addresses		

Example issues/ example questions/ tasks being completed	1. Tune a PID controller using optimization methods. 2. Implement a simple optimization algorithm in a PLC. 3. Implement a decision-making system for scheduling in environmental control systems. 4. Implement a decision support system for the operator of a computer-aided control system.
Practical activities within the subject	Not applicable

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