GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00061832		
Field of study	Management and Production Engineering		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Bogdan Ścibiorski	
	Teachers		

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	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	0.0	0.0	45

Subject objectives	The aim of the course is to introduce students from management and production engineering to the basics of using Manufacturing Execution Systems (MES) and the principles of Industry 4.0 for effective data acquisition. Participants will learn to define requirements and shape project assumptions, gaining an understanding of the impact of modern technologies on process optimization and enhancing production efficiency.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K01] is aware of the need to expand knowledge and verify the methods of solving problems by consulting experts	Students will learn to search for and apply expert knowledge in the field of SCADA, HMI, PLC systems, and Industry 4.0 to solve problems related to data acquisition. They will gain skills in identifying and applying new technologies and methods in the optimization of production processes. They will be encouraged to continuously develop their knowledge and skills, adopting a critical and open approach to methods and technologies.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice
[K7_U01] can obtain information from literature, databases and others sources, also in English or another foreign language recognized as the language of international communication in a given engineering discipline; is able to integrate the obtained information, interpret it, as well as draw conclusions and formulate and justify opinions.	Students will be able to efficiently search for information in literature, databases, and other sources. They will master the skills of critical analysis of collected data, allowing them to gain a deeper understanding of the technologies used and trends in production automation. They will acquire the ability to integrate and interpret data, drawing conclusions important for engineering. They will develop the capacity to formulate justified opinions and present recommendations in an engineering environment.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task
[K7_K02] is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions made demonstrates knowledge of actions to reduce risk and anticipate the social impact of engineering and manufacturing activities	Students will have a foundation in the use of Manufacturing Execution Systems for effective acquisition and analysis of production data. Students will be able to set design requirements for user interfaces and visualization systems, aimed at improving operators' interaction with machines and production processes.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice
[K7_W01] knows and understands to a greater extent selected issues in the field of management and quality sciences and mechanical engineering, their location in the field of social sciences and engineering and technical sciences, as well as relationships with related disciplines, and sees the possibility of applying the knowledge in practice.	Students will learn about the application of SCADA systems, HMI, PLC controllers, and Industry 4.0 in management and production quality. The learning will cover the integration of these technologies with management, enhancing process efficiency. They will learn to conceptually design automation systems that facilitate the control of production processes. It develops an interdisciplinary understanding of the relationships between engineering and management, preparing students to apply technology in engineering practice and process improvement.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Lecture: Introduction to information systems in an enterprise. Automation pyramid, Manufacturing Execution Systems (MES), designing Supervisory Control and Data Acquisition (SCADA) systems, Human-Machine Interfaces (HMI), sensors used in production lines, Programmable Logic Controllers (PLC), binary and analog inputs and outputs, SQL server, database queries, industrial networks in automated production, standardization of data flow in production systems, Industry 4.0.

Laboratory: Designing a supervisory SCADA system for a production station, analyzing the production system in terms of supported input and output signals, controller analysis, planning the visualization of the supported station, analysis and selection of objects for visualization, assigning scripts to perform tasks, validating system operation.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	60.0%	40.0%
Written exam	60.0%	60.0%

Recommended reading	Basic literature	Systemy DCS i SCADA / Sebastian Plamowski, Andrzej Wojtulewicz Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2022 Ćwikła G: System akwizycji informacji produkcyjnych dla potrzeb zarządzania przedsiębiorstwem. Wydawnictwo Politechniki Śląskiej, Gliwice 2013 Knosala R. (red.): Inżynieria produkcji, kompendium wiedzy, PWE, Warszawa 2017 Banaszak Z., Kłos S., Mleczko J.: Zintegrowane systemy zarządzania. PWE, Warszawa 2016 https://www.dbc.wroc.pl/Content/26216/PDF/burduk_modelowanie.pdf
	Supplementary literature	P. Buchwald, G.Granosik, A.Gwiazda: Internet Rzeczy i jego przemysłowe zastosowania, Polskie Wydawnictwo Ekonomiczne, Warszawa 2022 Hugh Jack, **Automating Manufacturing Systems with PLCs**, 2010,
	eResources addresses	Uzupełniające Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	• Functionality and benefits of implementing MES (Manufacturing Execution Systems) class systems, • Sensors in automated discrete manufacturing, • Differences between HMI (Human Machine Interface) and SCADA (Supervisory Control and Data Acquisition), • Methods of data collection in automated production, • ISA-95 standard.	
Work placement	Not applicable	