GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modeling and automation of technological processes, PG_00064938						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2027		Academic year of realisation of subject	2027/2028			
Education level	second-cycle studies		Subject group	Specialty subject group Subject group related to scientific research in the field of study			
Mode of study	Part-time studies		Mode of delivery	at the university			
Year of study	1		Language of instruction	Polish			
Semester of study	2		ECTS credits	3.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Bogdan Ścibiorski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	18.0	0.0	0.0	9.0	0.0	27
	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	27		5.0		43.0	75
Subject objectives	Familiarization with the principles of creating realistic models of manufacturing processes for simulation purposes in automated production environments.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U02] formulates and solves technical problems specific to Mechanics and Mechanical Engineering using appropriate tools including CAD and MES systems, and prepares technical documentation	The student formulates and solves technical problems specific to mechanics and machine construction, using appropriate tools for modeling and analyzing production processes. The student is able to develop simulation reports and assess the efficiency of production systems.	[SU1] Assessment of task fulfilment
[K7_W02] demonstrates a structured and theoretically grounded knowledge of the key topics in Mechanical Engineering enabling the analysis and modelling of mechanical systems, processes and devices	The student demonstrates structured and theoretically grounded knowledge in the field of modeling and automation of technological processes, enabling the analysis and simulation of production systems and their optimization.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K7_W13] explains the main principles of individual and teamwork organization, including various forms of entrepreneurship utilizing knowledge from the field of engineering and technical sciences and disciplines relevant to the course of study	The student understands the fundamental principles of individual and team work organization in the context of designing and implementing automated production systems, taking into account aspects of production engineering and process optimization.	[SW3] Assessment of knowledge contained in written work and projects
[K7_K13] is ready for responsible performance of proffesional roles, considering ever-changing need of the society, including self developement and supporting and fullfiling work ethics	The student is prepared to responsibly perform professional roles in the field of analysis, modeling, and optimization of production systems, considering the dynamic development of technology and its impact on society and the economy.	[SK1] Assessment of group work skills

Subject contents

Course content – lecture

Simulation model. Characteristics of the manufacturing system. Forms of automated production. Manufacturing flexibility. Machining automation. Production system modeling techniques. The concept of the system. Problems of stochastic processes. Modeling methods. Description of simulation objects. Techniques for measuring simulation results. Selected models of production systems in the conditions of automated production.

Course content – project

Design of a manufacturing structure model, determination of values for the parameters describing the efficiency of the manufacturing system. Model optimization. Decomposition and simulation

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	56.0%	50.0%
Assessment test	56.0%	50.0%

Recommended reading

Basic literature

1. Symulacja stosowana Modelowanie i analiza przy wykorzystaniu FlexSim / Malcolm Beaverstock, Allen Greenwood, William Nordgren ; przekład Katarzyna Gdowska. Beaverstock, Malcolm, Kraków : InterMarium, 2019,
2. Flexim, Podręcznik użytkownika, Krzysztof Andrzej Jurczyk, InterMarium, 2022.

Supplementary literature

1. Zdanowicz R., Świder J.: Komputerowe Modelowanie procesów wytwórczych, Wydawnictwo Politechniki Śląskiej, Gliwice 2013
2. Hromada J., D. Plinta D.: Modelowanie i symulacja systemów produkcyjnych, Wydawnictwo Politechniki Łódzkiej, Bielsko- Biała 2000. Lasota A.: Modelowanie procesów produkcyjnych z wykorzystaniem diagramów aktywności języka UML i sieci Petriego Warszawa Exit 2012
3. Antczak P., Antaczak A., Witkowski T.: Optymalizacja przepływu produkcji seryjnej, PWE Warszawa 2016
4. Palchevskyi B., Świć A., Pavlysh V., Banaszak Z., Gola A., Krestianpol O., Lozynskyi V.: Komputerowo zintegrowane projektowanie elastycznych systemów produkcyjnych, Monografia, Politechnika Lubelska 2015

eResources addresses

Example issues/ example questions/ tasks being completed	Creating a simulation model for a selected production system Analysis of production system efficiency based on simulation results Identification and optimization of bottlenecks in the production process Evaluation of the impact of manufacturing flexibility on system performance Application of modeling methods for the analysis of automated production systems Techniques for measuring simulation results and their interpretation.
Practical activites within the subject	Not applicable

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