GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modeling and automation of technological processes, PG_00064851		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Specialty subject group 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	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 -> Wydziały Politechniki Gdańskiej		
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	0.0	15.0	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	5.0	25.0	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_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
[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

<table>
<tr><td>Subject contents</td><td>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.

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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Assessment test</td><td>56.0%</td><td>50.0%</td></tr>
<tr><td>Project</td><td>56.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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.</td></tr>
<tr><td>Supplementary literature</td><td>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.
3. Lasota A.: Modelowanie procesów produkcyjnych z wykorzystaniem diagramów aktywności języka UML i sieci Petriego Warszawa Exit 2012
4. Antczak P., Antaczak A., Witkowski T.: Optymalizacja przepływu produkcji seryjnej, PWE Warszawa 2016
5. Palchevskyi B., Świć A., Pavlysh V., Banaszak Z., Gola A., Krestianpol O., Lozynskyi V.: Komputerowo zintegrowane projektowanie elastycznych systemów produkcyjnych, Monografia, Politechnika Lubelska 2015</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Creating a simulation model for a selected production system
2. Analysis of production system efficiency based on simulation results
3. Identification and optimization of bottlenecks in the production process
4. Evaluation of the impact of manufacturing flexibility on system performance
5. Application of modeling methods for the analysis of automated production systems
6. Techniques for measuring simulation results and their interpretation</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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