



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 2025	Academic year of realisation of subject				2025/2026	
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						
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	<i>Familiarization with the principles of creating realistic models of manufacturing processes for simulation purposes in automated production environments.</i>						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[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 professional roles, considering ever-changing need of the society, including self development and supporting and fulfilling 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_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.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[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		

Subject contents	<p>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.</p> <p>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.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1" data-bbox="450 418 1489 517"> <thead> <tr> <th data-bbox="450 418 794 450">Subject passing criteria</th> <th data-bbox="794 418 1139 450">Passing threshold</th> <th data-bbox="1139 418 1489 450">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="450 450 794 481">Project</td> <td data-bbox="794 450 1139 481">56.0%</td> <td data-bbox="1139 450 1489 481">50.0%</td> </tr> <tr> <td data-bbox="450 481 794 517">Assessment test</td> <td data-bbox="794 481 1139 517">56.0%</td> <td data-bbox="1139 481 1489 517">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Project	56.0%	50.0%	Assessment test	56.0%	50.0%
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Project	56.0%	50.0%										
Assessment test	56.0%	50.0%										
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Symulacja stosowana Modelowanie i analiza przy wykorzystaniu FlexSim / Malcolm Beaverstock, Allen Greenwood, William Nordgren ; przekład Katarzyna Gdowska. Beaverstock, Malcolm, Kraków : InterMarium, 2019,</li> <li>2. Flexim, Podręcznik użytkownika, Krzysztof Andrzej Jurczyk, InterMarium, 2022.</li> </ol>										
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Zdanowicz R., Świder J.: Komputerowe Modelowanie procesów wytwórczych, Wydawnictwo Politechniki Śląskiej, Gliwice 2013,</li> <li>2. Hromada J., D. Plinta D.: Modelowanie i symulacja systemów produkcyjnych, Wydawnictwo Politechniki Łódzkiej, Bielsko- Biała 2000.</li> <li>3. Lasota A.: Modelowanie procesów produkcyjnych z wykorzystaniem diagramów aktywności języka UML i sieci Petriego Warszawa Exit 2012</li> <li>4. Antczak P., Antczak A., Witkowski T.: Optymalizacja przepływu produkcji seryjnej, PWE Warszawa 2016</li> <li>5. Palchevskiy B., Świć A., Pavlysh V., Banaszak Z., Gola A., Krestianpol O., Lozynskiy V.: Komputerowo zintegrowane projektowanie elastycznych systemów produkcyjnych, Monografia, Politechnika Lubelska 2015</li> </ol>										
	eResources addresses	Adresy na platformie eNauczanie:										
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Creating a simulation model for a selected production system</li> <li>2. Analysis of production system efficiency based on simulation results</li> <li>3. Identification and optimization of bottlenecks in the production process</li> <li>4. Evaluation of the impact of manufacturing flexibility on system performance</li> <li>5. Application of modeling methods for the analysis of automated production systems</li> <li>6. Techniques for measuring simulation results and their interpretation</li> </ol>											
Work placement	Not applicable											

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