GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Optimization of production process, PG_00056144		
Field of study	Management and Production Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	first-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	4	ECTS credits	7.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Zakład Technologii Maszyn i Automatyzacji Produkcji -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Maciej Majewski	
	Teachers	dr hab. inż. Maciej Majewski dr inż. Mieczysław Siemiątkowski mgr inż. Karolina Chodnicka-Wszelak	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	15.0	0.0	90
	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	90	0.0	0.0	90

Subject objectives	Presentation of methods to optimize production processes using mathematical models. Discussion of methods of empirical research and defining optimization problems as well as creating optimization and statistical models of selected processes.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U06] when formulating and solving engineering tasks a student can see aspects of system management and organization of individual and as a team, taking into account the human factor, has necessary peparation for work in an industrial environment, and knows the rules and standards related to occupational health and safety	The student defines problems and creates optimization models and takes into account technical, technological and economic conditions of selected processes during optimization.	[SU2] Assessment of ability to analyse information
	[K6_W08] has basic management knowledge, including process and product quality management, and detailed knowledge of integrated and standardized quality, environmental, health and safety management systems	The student has basic knowledge of planning the implementation and statistical analysis of the results of technological experiments.	[SW1] Assessment of factual knowledge
	[K6_W10] has basic knowledge necessary to understand the economic determinants of engineering activities and economic law, to improve the work environment affecting productivity, costs and quality of work	The student understands the relationship between the method of production optimization and economic and legal aspects.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U01] can find the necessary information in professional literature, databases and other sources, knows basic scientific and technical journals in the field of production management, quality and operation management, can integrate the obtained information, formulate conclusions and justify opinions	The student looks for the necessary information in the professional literature to carry out the process of statistical research and production optimization.	[SU4] Assessment of ability to use methods and tools
	[K6_K01] feels the need for self-realization by learning throughout life, is looking for modern and innovative solutions in their actions, is able to think creatively and act in an entrepreneurial way	When carrying out an optimization task, the student is aware of the limitations and is able to look for new, innovative solutions.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Introduction to mathematical optimization.

Defining optimization problems.

Creating statistical models of selected processes.

Creating optimization models of selected processes.

Optimization methods and examples of optimization tasks.

Structure of the manufacturing process.

Structural optimization.

Parametric optimization.

Optimization methods.

Optimization criteria.

Evaluation of optimization variants.

Selection of optimal parameters and treatments.

Prerequisites and co-requisites	Fundamentals of the application of analytical methods and mathematical software. Basic knowledge of designing the production process.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Exercise test	60.0%	25.0%
Project	60.0%	25.0%
Laboratory reports	60.0%	25.0%
Lecture test	60.0%	25.0%

Recommended reading	Basic literature	Stadnicki Jacek, "Theory and practice of solving optimization problems with examples of technical applications", Wydawnictwo Naukowe PWN 2023. Kusiak Jan, Danielewska-Tułecka Anna, Oprocha Piotr, "Optimization. Selected methods with examples", Wydawnictwo Naukowe PWN 2021. Płonka Stanisław, "Multi-criteria optimization of machine parts manufacturing processes", WNT Warszawa 2010. Korzyński Mieczysław, "Experiment methodology - planning, implementation, development of results of technological experiments", WNT Warszawa 2006.
	Supplementary literature	Janiak Adam, "Selected problems and algorithms for task scheduling and resource allocation", Akademicka Oficyna Wydawnicza PLJ, Warsaw 1999.
	eResources addresses	Adresy na platformie eNauczanie: Optymalizacja procesów produkcyjnych, ZiIP (PG_00056144) - sem. letni 2023/2024 - Moodle ID: 36872 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36872
Example issues/ example questions/ tasks being completed	Analyzes of mathematical optimization scopes. Defining optimization problems for selected production and logistics processes. Creating statistical models of selected processes. Creating optimization models of selected processes. Using selected optimization methods and solving examples of optimization tasks. Analysis of the structure of the manufacturing process. Development of examples of structural optimization. Development of examples of parametric optimization. Review and discussion of optimization methods. Review and discussion of optimization criteria. Evaluation of optimization variants. Selection of optimal parameters and treatments.	
Work placement	Not applicable	

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