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 2021	Academic year of realisation of subject	2022/2023
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	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	mgr inż. Karolina Chodnicka-Wszelak
		dr hab. inż. Maciej Majewski
		dr inż. Mieczysław Siemiątkowski

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 the 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 a basic knowledge of planning the implementation and statistical processing of the results of technological experiments.	[SW1] Assessment of factual knowledge
	[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 will search the literature for the necessary information to implement the statistical research and production optimization process.	[SU4] Assessment of ability to use methods and tools
	[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 of how to optimize production with economic and legal aspects.	[SW3] Assessment of knowledge contained in written work and projects
	[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	During realization of an optimization task, the student is aware of the existing 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 optimization models of selected processes. Creating statistical models of selected processes. Optimization methods and examples of optimization tasks. The 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	

Assessment methods and criteria			
	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exercises	60.0%	25.0%
	Written theory	60.0%	25.0%
	Reports form laboratories	60.0%	25.0%
	Projects	60.0%	25.0%

Recommended reading	Basic literature	Stadnicki Jacek, "Teoria i praktyka rozwiązywania zadań optymalizacji z przykładami zastosowań technicznych", Wydawnictwo Naukowe PWN 2023. Kusiak Jan, Danielewska-Tułecka Anna, Oprocha Piotr, "Optymalizacja. Wybrane metody z przykładami", Wydawnictwo Naukowe PWN 2021. Płonka Stanisław, "Wielokryterialna optymalizacja procesów wytwarzania części maszyn", WNT Warszawa 2010. Korzyński Mieczysław, "Metodyka eksperymentu - planowanie realizacja opracowywanie wyników eksperymentów technologicznych", WNT Warszawa 2006.
	Supplementary literature	Janiak Adam, "Wybrane problemy i algorytmy szeregowania zadań i rozdziału zasobów", Akademicka Oficyna wydawnicza PLJ, Warszawa 1999.

	eResources addresses	Adresy na platformie eNauczanie:
		Optymalizacja procesów produkcyjnych - Moodle ID: 29555 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29555
Example issues/ example questions/ tasks being completed	Fundamentals of mathematical optimization. Defining optimization problems for selected production and logistics processes. Creating optimization models of selected processes. Creating statistical models of selected processes. The use of selected optimization methods and solving examples of optimization problems. Analysis of the structure of the manufacturing process. Development of an example of structural optimization. Developing an example of parametric optimization. Overview and discussion of optimization methods. Overview and discussion of optimization criteria. Evaluation of optimization variants. Selection of optimal parameters and treatments.	
Work placement	Not applicable	