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 2025		Academic year of realisation of subject	2026/2027			
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	assessment			
Conducting unit	Division of Manufacturing and Production Engineering -> 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. Dominika Zakrzewska				
	Teachers						
Lesson types	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						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=4581						

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	A presentation of methods and approaches for optimizing production processes. A discussion of empirical research methods, defining optimization problems, and creating optimization and statistical models for selected processes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	Student has basic knowledge of planning the implementation and statistical analysis of the results of technological experiments.	[SW1] Assessment of factual knowledge
[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	Student carrying out an optimization task and is aware of the existing limitations and is able to search for new, innovative solutions.	[SK5] Assessment of ability to solve problems that arise in practice
[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	Student searches the professional literature for the information necessary to implement the statistical research process and production optimization.	[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	Student understands the relationship between production optimization methods and economic and legal aspects.	[SW3] Assessment of knowledge contained in written work and projects
[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	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

Subject contents

Course content – lecture

1. Basic concepts in manufacturing processes and production engineering.
2. Introduction to basic methods and approaches to optimizing manufacturing processes.
3. Creating optimization models for selected processes.
4. Optimization methods and examples of optimization tasks.
5. Manufacturing process structure.
6. Optimization criteria.
7. Evaluation of optimization options.
8. Selection of optimal parameters and procedures.

Course content – exercises

Planning according to the production cycle.
Material requirements planning MRP, Kanban, DDMRP, consumption method, forecasting method.
Designing and streamlining flow production.
Production process efficiency analysis OEE.
Value stream mapping (VSM).

Course content – laboratory

Production cycle analysis, operation scheduling.
Material requirements calculation (MRP, Kanban, DDMRP, forecasting).
Layout design and material flow analysis.
OEE optimization, downtime analysis.
Value Stream Mapping (VSM) creation.
Production process modeling and simulation.

Course content – project

Optimization of the selected production process using Lean Manufacturing tools and computer software to simulate production process flows.

Prerequisites and co-requisites

Fundamentals of analytical methods and mathematical software. Basic knowledge of production process design.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture	60.0%	25.0%
Practical classes	60.0%	20.0%
Laboratory	60.0%	25.0%
Project	60.0%	30.0%

Recommended reading	Basic literature	1. Stadnicki Jacek, "Teoria i praktyka rozwiązywania zadań optymalizacji z przykładami zastosowań technicznych", Wydawnictwo Naukowe PWN 2023. 2. Kusiak Jan, Danielewska-Tułecka Anna, Oprocha Piotr, "Optymalizacja. Wybrane metody z przykładami", Wydawnictwo Naukowe PWN 2021. 3. Płonka Stanisław, "Wielokryterialna optymalizacja procesów wytwarzania części maszyn", WNT Warszawa 2010. 4. Korzyński Mieczysław, "Metodyka eksperymentu - planowanie realizacja opracowywanie wyników eksperymentów technologicznych", WNT Warszawa 2006.
	Supplementary literature	1. Janiak Adam, "Wybrane problemy i algorytmy szeregowania zadań i rozdziału zasobów", Akademicka Oficyna wydawnicza PLJ, Warszawa 1999.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Defining optimization problems for selected production and logistics processes. 2. Basic definitions of production process optimization. 3. Review and discussion of optimization criteria. 4. Review and discussion of optimization methods.	
Practical activites within the subject	Not applicable	

Document generated electronically. Does not require a seal or signature.