GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Design of supply systems, PG_00064725						
Field of study	Management and Production 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	4.0			
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 inż. Aleksandra Wiśniewska				
	Teachers						

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	15.0	0.0	60
	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	60	9.0	31.0	100

Subject objectives	The student learns the goals and principles of the logistics system in the enterprise. By deepening the knowledge and performing simple exercises related to the analyzed areas of issues in the field of logistics and warehousing, the student can independently design a logistics system, starting from the development of a supply system and an optimized technological line, through the evaluation and selection of suppliers, and ending with efficient distribution.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W01] explains and describes, on the basis of general knowledge in the field of scientific disciplines creating the theoretical basis for Management and Production Engineering, the structure and principles of operation of production systems and processes and their elements, as well as methods and means of their integration and control	The student is able to independently design elements of a logistics system, taking into account the company's goals and the principles of logistics.	[SW3] Assessment of knowledge contained in written work and projects
	[K7_K12] is ready for fullfiling social commitement and initation of actions for public interest including entrepreneurial thinking and acting	The student demonstrates readiness to implement and initiate actions to optimize logistics taking into account the public interest and entrepreneurship.	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_U04] creatively designs or modifies, in whole or at least in part, production and technological systems and processes, in accordance with the given specifications, taking into account technical and non-technical aspects, estimating costs and using known design techniques appropriate for tasks in the field of Management and Production Engineering	The student is able to describe the principles of operation of logistics systems, methods of their integration and control.	[SU3] Assessment of ability to use knowledge gained from the subject
	[K7_U15] evaluates the feasibility of advanced methods and tools for solving complex engineering tasks of a practical nature, characteristic of the field of study, and selects and applies appropriate methods and tools for this purpose	The student is able to select and apply appropriate analysis tools and techniques for a complex logistics task.	[SU4] Assessment of ability to use methods and tools

Subject contents	**Lectures content (30 hours)** 1. **Logistics Definitions and Objective**s • **Detailed contents:** History of logistics, contemporary importance of logistics in the supply chain, role of logistics in production and services. 2. **Logistic system and process; transportability of various product ranges** • **Detailed content:** Types of logistics processes and their importance in various industries, transport analysis and logistics requirements for selected goods. 3. **Supply, production and distribution logistics** • **Detailed content:** Key stages of internal logistics, modeling of logistics processes in the enterprise, techniques and tools. 4. **Logistics infrastructure - material flow** • **Detailed contents:** Warehousing, flow of goods in the warehouse, means of internal transport, Pareto principles and allocation of goods. 5. **Logistics infrastructure - information flow** • **Detailed contents:** Probability theory, inventory management (ABC/XYZ, EOQ, MRP, DRP, JIT). 6. **Design of logistics systems and storage spaces** • **Detailed content**: Selection of the optimal warehouse layout, spatial arrangement of stations. 7. **Analysis of the efficiency of logistics systems** • **Detailed content:** KPI (Key Performance Indicators) in logistics, methods of measuring logistics efficiency. 8. **Provisions of EU Directives and technical supervision** • **Detailed content:** Legal regulations in logistics, ISO standards, principles of technical supervision. **Exercises (15 hours)** 1. **Pareto Analysis in Warehouse: Problems, Analysis, Corrective Actions** • Problem-solving exercise in inventory management based on Pareto analysis. 2. **Transportation Resource Planning** • Vehicle selection calculations, transport scheduling and transport cost analysis. 3. **Transport network flows and capacity; shortest route and optimal allocation** • Practical exercises in routing and capacity optimization, Dijkstra's algorithms and linear programming techniques. 4. **Load capacity: vehicle, pallet** • Calculations of vehicle load capacity and storage space utilization; practical tasks. **Project (15 hours)** **Project topic:** Optimization of logistics processes in a selected manufacturing or service enterprise. • **Scope**: • Analysis of the company's structure and logistics processes. • Process mapping: sales, storage, supply, transport, production, complaints. • Development of process cards for the main departments (e.g. storage of semi-finished products, production). • Proposals for improving logistics processes taking into account Lean principles and cost effectiveness. • **Implementation method:** Group work, case studies, computer simulations.
Prerequisites and co-requisites	Knowledge of issues related to project management and human resources. Knowledge of issues related to the basics of production and service management.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
egzamin	60.0%	30.0%
project	60.0%	35.0%
exercises	60.0%	35.0%

Recommended reading	Basic literature	Szymonik Andrzej , Chudzik Daniel, Nowoczesna koncepcja logistyki produkcji, Difin 2020 Rudawska Anna, Logistyka procesów produkcji, Wydawnictwa Komunikacji i Łączności WKŁ 2016 Gwynne Richards, Zarządzanie logistyką magazynową, Wydawnictwo Naukowe PWN 2021 Jacyna Marianna, Lewczuk Konrad, Projektowanie systemów logistycznych., PWN 2016 Bukowski L., Zapewnienie ciągłości dostaw w zmiennym i niepewnym otoczeniu., WSB 2016 Materials and articles provided by the teacher
	Supplementary literature	Wojewódzka-Król Krystyna , Rolbiecki Ryszard, Infrastruktura transportu. Europa, Polska teoria i praktyka, Wydawnictwo Naukowe PWN 2018 Pfohl Hans-Christian, Zarządzanie logistyką. Funkcje i Instrumenty., Biblioteka logistyka 1998 Skowronek Czesław, Sarjusz-Wolski Zdzisław, Logistyka w przedsiębiorstwie., PWE 2013 Materials and articles provided by the teacher
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	**Theoretical Questions** 1. **Definitions and Fundamentals of Logistics** • What are the basic objectives of logistics and what is the importance of logistics in the activities of manufacturing companies? • Explain the difference between supply logistics, production logistics and distribution logistics. 2. **Logistics System and Logistics Process** • What is a logistics system? List its components. • Explain the concept of transportability and provide examples of goods that require special transport conditions. 3. **Logistics Infrastructure** • What are the basic types of warehouses and what functions do they perform in logistics systems? • What is the Pareto principle and how is it applied in warehousing? 4. **Inventory Management** • Discuss the differences between the ABC/XYZ, EOQ and MRP methods in inventory management.i. • Explain the JIT (Just-in-Time) principle and describe its advantages and disadvantages in the context of supply logistics. 5. **Design of Logistics Systems** • What factors should be considered when designing a warehouse layout? • Explain how a logistics system can be optimized using throughput analysis. 6. **Efficiency of logistics systems** • What performance indicators (KPIs) are used to assess the efficiency of logistics systems? • Discuss how the efficiency of transport systems can be measured and assessed. 7. **Legal regulations in logistics** • What EU regulations affect the functioning of logistics systems in Poland? • List and describe the basic technical supervision regulations that should be taken into account in logistics systems. **Practical issues** 1. **Case studies** • Present an example of the application of Pareto analysis in a warehouse - what part of the assortment would you select for detailed inspection and why? • Please develop a plan for optimizing transport resources in a manufacturing company using selected goods as an example. 2. **Warehouse design** • Design a warehouse layout for a company selling car parts. Take into account the flow of goods, the layout of storage zones and the technical means needed to service the warehouse. 3. **Flow and throughput planning** • Please explain how the flow of goods in a transport network can be optimized. Use the shortest path method or Dijkstra's algorithm. • Provide an example of resource allocation optimization in a logistics network. What factors should be considered when planning throughput? 4. **Vehicle and pallet capacity** • Calculate the optimal number of pallets needed to transport the selected product. Take into account the vehicle capacity and the dimensions of the product. • Describe how the appropriate arrangement of goods on a pallet affects transport efficiency.. 5. **Analysis and evaluation of the efficiency of logistics systems** • Please select two KPIs used in logistics and discuss their role in assessing the efficiency of the supply system. • Analyze the selected logistics system in terms of the efficiency of warehouse processes - indicate optimization possibilities. **Design questions** 1. **Mapping logistics processes** • What information should be included in the storage process card? Please provide an example card.. • Please identify and describe the main stages of the logistics process for the sales process in a manufacturing company. 2. **Optimization of logistics processes** • Select a logistics process (e.g. storage of semi-finished products, transport) and propose improvement actions that will affect its efficiency. • Please develop optimization proposals for the supply process in the company, taking into account the principles of Lean Management. 3. **Warehouse space design concept** • Please design a warehouse space for a company that distributes household appliances, taking into account different types of goods and optimizing their layout. • What elements should be included when designing the goods receipt and issue zone in the warehouse? **Learning outcomes and assessment** • **Learning outcome 1**: Logistics system design and optimization - tasks related to the design of warehouse space, process cards and optimization of logistics processes. • **Learning outcome 2**: Ability to analyze and act entrepreneurially - questions about KPIs, inventory management and methods such as JIT and design aspects related to flow planning.w. • **Learning outcome 3**: Description of the structure and operating principles of systems - theoretical questions about logistics infrastructure, information flow and inventory management systems. • **Learning outcome 4:** Selection of tools and methods - practical and design questions related to the analysis of flows and the selection of optimal management methods in logistics.
Work placement	Not applicable

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