# Quantitative methods in logistics - opis przedmiotu

## Informacje ogólne

| | |
|---|---|
| Nazwa przedmiotu | Quantitative methods in logistics |
| Kod przedmiotu | 06.9-WM-ZiIP-ZL-ANG-D-14_20 |
| Wydział | Wydział Mechaniczny |
| Kierunek | Management and Production Engineering |
| Profil | ogólnoakademicki |
| Rodzaj studiów | drugiego stopnia z tyt. magistra inżyniera |
| Semestr rozpoczęcia | semestr zimowy 2023/2024 |

## Informacje o przedmiocie

| | |
|---|---|
| Semestr | 2 |
| Liczba punktów ECTS do zdobycia | 4 |
| Typ przedmiotu | obowiązkowy |
| Język nauczania | angielski |
| Sylabus opracował | • dr hab. inż. Sławomir Kłos, prof. UZ |

## Formy zajęć

| Forma zajęć | Liczba godzin w semestrze (stacjonarne) | Liczba godzin w tygodniu (stacjonarne) | Liczba godzin w semestrze (niestacjonarne) | Liczba godzin w tygodniu (niestacjonarne) | Forma zaliczenia |
|---|---|---|---|---|---|
| Laboratorium | 30 | 2 | - | - | Zaliczenie na ocenę |
| Wykład | 30 | 2 | - | - | Egzamin |

## Cel przedmiotu

The goal is to gain specialist knowledge regarding the application of quantitative methods in the design, planning and analysis of logistics processes.

## Wymagania wstępne

Operational research, engineering optimization, statistics

## Zakres tematyczny

As part of the lecture the following issues are discussed:

Lectures: Quantitative methods - methodological problems. Forecasting methods in logistics. Quantitative methods in managing transport processes. Quantitative methods in the configuration of the logistics network. Inventory management methods. Application of quantitative methods in warehouse design. Modeling and simulation in logistics. Determining the size of the delivery lot. Network methods in logistics project management.

Exercises: Planning transport routes. Forecasting primary demand. Location of nodal points of the network. Materials inventory control. Finished goods inventory control. Warehouse design. Modeling and simulation of logistics processes using Tecnomatix Plant Simulation.

W1. Introduction to production logistics.

W2. Spatial planning of production systems and design of production flow.

W3. Warehouse and material management, inventory management.

W4. Determining the size of production batches and deliveries.

W5. Production flow analysis using belt and roller conveyors.

W6. Production flow analysis using forklifts or AGV.

W7. Modeling and simulation of production logistics processes.

W8. Analysis of procurement processes, planning the volume of deliveries, MRP.

W9. Analysis of bottlenecks, balancing production lines.

W10. Production flow identification, barcodes, RFiD.

W11. Methods of supporting the planning of product distribution processes.

W12. KANBAN production control, Just in Time orders, case study of the automotive industry.

W13. Application of industrial robots and manipulators in logistics,

W14. IT support for logistic processes, reporting of the course of logistic processes.

W15. Trends in the development of production logistics systems, industry 4.0.

L1. Introduction to modeling production processes in Tecnomatix Plant Simulation.

L2, L3 - Modeling and simulation of discrete processes.

L4, L5 - Modeling of production logistics processes with the use of conveyors.

L6, L7 - Modeling of production logistics processes with the use of self-propelled trucks.

L8, L9 - Modeling of production logistics processes with the use of palletizing systems.

L10, L11 - Modeling of production logistics processes with the use of pallets. Production flow models for different production batch sizes.

L12, L13 - Modeling and simulation of energy consumption in production systems.

L14, L15 - Designing simulation experiments.

## Metody kształcenia

Teaching methods: conventional lecture, laboratory

## Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

| Opis efektu | Symbole efektów | Metody weryfikacji | Forma zajęć |
|---|---|---|---|
| Student has expanded and in-depth knowledge of the application of mathematical methods to formulate and solve complex tasks related to Management and Mechanical Production Engineering | • K_W01 | • egzamin - ustny, opisowy, testowy i inne<br>• wykonanie sprawozdań laboratoryjnych | • Wykład<br>• Laboratorium |
| Student knows the basic methods, techniques, tools and materials used to solve complex engineering tasks related to Mechanical Engineering. | • K_W18 | • egzamin - ustny, opisowy, testowy i inne<br>• wykonanie sprawozdań laboratoryjnych | • Wykład<br>• Laboratorium |
| Student has structured and theoretically founded knowledge of integrated management systems. | • K_W11 | • egzamin - ustny, opisowy, testowy i inne<br>• wykonanie sprawozdań laboratoryjnych | • Wykład<br>• Laboratorium |
| Student has expanded and in-depth knowledge of operational research and numerical methods useful for formulating and solving complex tasks related to Management and Engineering of Mechanical Production. | • K_W04 | • egzamin - ustny, opisowy, testowy i inne<br>• wykonanie sprawozdań laboratoryjnych | • Wykład<br>• Laboratorium |
| Student has structured and theoretically founded knowledge of computer-aided management in an enterprise | • K_W09 | • bieżąca kontrola na zajęciach<br>• egzamin - ustny, opisowy, testowy i inne<br>• wykonanie sprawozdań laboratoryjnych | • Wykład<br>• Laboratorium |
| Student ss able to select and use appropriate computer applications for calculations, simulations, design and verification of solutions in the field related to Management and Mechanical Production Engineering | • K_U11 | • wykonanie sprawozdań laboratoryjnych | • Laboratorium |

## Warunki zaliczenia

Lecture: Credit with a grade. The grade is issued on the basis of a written test covering verification of knowledge of basic issues.

Laboratory: passing the grade. The grade is determined based on laboratory exercises.

Final grade - arithmetic average of grades for individual forms of classes.

## Literatura podstawowa

1. Krawczyk S. Metody ilościowe w logistyce, C.H.Beck, Warszawa 2001.

2. Bendkowski J, Kramarz M., Kramarz W., Metody i techniki ilościowe w logistyce stosowanej. Wybrane zagadnienia, Wydawnictwo Politechniki Śląskiej, Gliwice 2010.

## Literatura uzupełniająca

## Uwagi

Zmodyfikowane przez dr inż. Tomasz Belica (ostatnia modyfikacja: 12-04-2023 23:05)