COURSE DESCRIPTION CARD - SYLLABUS

Course name
Warehouses Design [N1Log2>PM]

Course

Field of study
Logistics

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
10

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
16

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

The student starting this subject should have a basic knowledge of the basics of technology and logistics infrastructure. The student should also be able to obtain information from specified sources and be willing to cooperate as part of a team.

Course objective

Providing students with basic knowledge related to warehouse design. To develop practical skills related to making decisions regarding the selection of an appropriate system for storing goods and warehouse equipment.

Course-related learning outcomes

Knowledge:
1. Student defines key aspects of construction, technology and techniques used in logistics, with particular emphasis on warehouse design [P6S_WG_01]
2. Student lists and describes the basic concepts of logistics and supply chain management, important for warehouse design [P6S_WG_05]
3. Student characterizes the best practices in logistics, focusing on modern warehouse solutions

[P6S_WK_06]
4. Student lists and describes the basic methods, techniques, tools and materials used in scientific research and when solving engineering tasks in the field of warehouse design [P6S_WK_07]

Skills:
1. Student interprets and presents information regarding warehouse design, using the subject literature and other sources [P6S_UW_01]
2. Student uses experimental techniques, including computer simulation, to analyze and optimize warehouse processes [P6S_UW_03]
3. Student plans and implements work measures consistent with safety rules in warehouses [P6S_UW_05]
4. Student calculates and evaluates economic aspects of warehouse design [P6S_UW_06]
5. Student designs a warehouse, using appropriate methods and techniques to meet specific logistic requirements [P6S_UW_07]

Social competences:
1. Student analyzes and critically evaluates cause-and-effect relationships in the warehouse design process [P6S_KK_01]
2. Student plans and manages processes related to warehouse design, demonstrating an entrepreneurial approach [P6S_KO_01]
3. Student recognizes and communicates the importance of initiating activities in the area of logistics [P6S_KO_02]
4. Student cooperates in a group to design a warehouse, distinguishing diversity and ethics in the context of teamwork [P6S_KR_02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
Formative assessment: Acquired knowledge is assessed throughout the semester on the basis of short written tests and assessment tasks completed after selected topic areas. The tests may include closed-ended and/or open-ended questions related to the course content covered.
Summative assessment: The final grade is determined based on the total number of points obtained throughout the semester from the various forms of knowledge assessment. Passing the course is possible upon obtaining at least 50% of the total number of points.
Project:
Formative assessment: Acquired knowledge and skills are assessed throughout the semester on the basis of partial grades covering successive stages of project implementation. Assessment criteria include the correctness of the developed solutions, the degree of completion of individual project components, and the timeliness of submitted work.
Summative assessment: The final grade is determined based on the results of the partial assessments and the final quality of the completed project

Programme content

The program includes definitions of the warehouse and the warehouse process, warehouse technologies, and the warehouse design process, calculations related to the warehouse area and volume.

Course topics

Lecture:
The essence of the warehousing process and the activities constituting this process. Definition of a warehouse. Types of warehouses. Types of warehouse equipment and principles for its selection. Innovative solutions used in warehouses, including technologies supporting order picking. Warehouse safety, including rules for storing hazardous goods, hazard identification, risk assessment, the use of personal protective equipment (PPE), requirements concerning safety labeling and documentation (MSDS/SDS), procedures for handling spills and emergencies, and principles of safe work organization. Order picking strategies and methods: picker-to-goods, goods-to-picker, pick-to-order, cluster picking, batch picking, zone picking, wave picking, as well as picking methods using scanning technologies, RFID, and automated systems. Cost optimization in the selection and operation of warehouse equipment. Warehouse

design process. Optimization of warehouse area and storage capacity. Warehouse documentation. Information systems supporting warehouse operations, including directed systems for order picking, replenishment, and goods allocation. Organization of inventory processes, including periodic and continuous inventory control, and verification of inventory record accuracy.
Project:
Warehouse technology (type and layout of the warehouse, assortment analysis, storage conditions, including rules for storing hazardous materials). Warehousing program (inventory status table, inventory movement table). Selection and quantity of warehouse equipment and devices supporting order picking. Design of order picking processes, taking into account order picking strategies. Calculation of warehouse area requirements. Space utilization design (warehouse floor plan, goods allocation method, location identification system, designation of safety zones and hazardous material storage areas). Organizational relationships as well as the scope of authority and responsibilities of positions. System for goods documentation and identification, as well as organization of inventory processes and inventory control procedures.

Teaching methods

Lecture: conventional specialist, conservation lecture.
Project: group project method.

Bibliography

Basic:
1. Fertsch M., Projektowanie magazynów [w:] Fertsch M. (red.), Elementy inżynierii logistycznej, Wydawnictwo Instytutu Logistyki i Magazynowania, Poznań 2017.
2. Krzyżaniak S., Organizowanie i monitorowanie procesów magazynowych, Instytut Logistyki i Magazynowania, Poznań 2013.
3. Kudelska I., Jędrzejak K., Methodology for Designing Spatial Layout of a Warehouse in the Context of Sustainable Development, Annales Universitatis Mariae Curie-Skłodowska, Sectio H, Oeconomia 2024, Vol. 58, no. 3, s. 51-68.
4. Kudelska I., Niedbał R., Technological and organizational innovation in warehousing process - research over workload of staff and efficiency of picking stations, E+M Ekonomie a Management, vol.23, 2020, nr 3.
5. Kudelska I., Pawłowski G., Influence of assortment allocation manage in the warehouse on the human workload, Centrl European Journal of Operations Research 28 (2), 2019.
6. Niemczyk A., Zarządzanie magazynem, Wyższa Szkoła Logistyki, Poznań 2010.
7. Pawłyszyn I., Maćkowiak N., Stachowiak A., Jańczak T., Elements of artificial intelligence applied in warehousing, [w:] Logistics in the enterprises - selected apsects, Fertsch M., Grzybowska K. (red.), Wyd. Politechnika Poznańska, Poznań 2010.
8. Pawłyszyn I., Maćkowiak N., Stachowiak A., Pacholski L., Completation of items in high storage warehouse with the expert system, Logistics and Transport, Nr 2(13)/2011, The International University of Logistics and Transport in Wrocław, Wrocław.
9. Szymonik A., Chudzik D., Logistyka nowoczesnej gospodarki magazynowej, Difin, Warszawa 2017.

Additional:
1. Fijałkowski J., Technologia magazynowania, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1995.
2. Gubała M., Popielas J., Podstawy zarządzania magazynem w przykładach, Wydawnictwo ILiM, Poznań 2002.
3. Manzini R. (ed.), Warehousing in the Global Supply Chain. Advanced Models, Tools and Applications for Storage Systems, Springer -Verlag, London 2012.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	26	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	74	2,50