STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Automation of Transportation and Warehousing**	Code **1010611251010610625**

Field of study **Transport**	Profile of study (general academic, practical) **(brak)**	Year /Semester **3 / 5**

Elective path/specialty **Logistics of Transport**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**

Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**

No. of hours

Lecture: **2**	Classes: **-**	Laboratory: **1**	Project/seminars: **-**	No. of credits **4**

Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**

Education areas and fields of science and art **technical sciences** **Technical sciences**	ECTS distribution (number and %**)** **4 100%** **4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Students have a basic knowledge concerning a construction and principles of operation of warehousing shelving and internal transportation means.
2	**Skills**	Students have a consciousness of the idea of warehouse application and are able to select the proper solution of internal transport in dependence on the case.
3	**Social competencies**	Students have a consciousness of the influence of the automation solution application on the effectiveness and costs of warehouses operating.

Assumptions and objectives of the course:

-Students are acquainted with the basic rules of the warehousing and internal transportation with the special taking into consideration automation solution in these aspects.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has a structured, theoretically founded knowledge in the field of warehousing (including storing, picking and internal transportation). Knows different storing technologies (including automatic solutions) and is able to select the proper solution of transportation to their service. - [K2A_W09]

2. Has a structured, theoretically founded knowledge in the field of internal transportation means. Knows basic types of forklift trucks (including AGV trucks, Teach-in technology), cranes and conveyors applying in warehousing ? is able to recognize them and characterize their structure and principle of operation. - [K2A_W09]

3. Has a structured, theoretically founded knowledge in the field of automatic identification (including bar codes and RFID technologies) and modern solutions of picking realization (including pick by voice, pick by light, pick-n-go etc.). - [K2A_W09]

Skills:

1. Is able to calculate: forklift trucks and stacker cranes demand, dimensions of pallet shelving etc. - [K2A_U14]

2. Is able to create simple Excel applications to solve above mentioned problems. - [K2A_U14]

Social competencies:

1. Understands the need and knows the possibilities of lifelong learning, knows the need for acquiring new knowledge for professional development. - [K1A_K01]

2. Is aware of and understands the importance and impact of non-technical aspects of transport engineering activities (including automatic solutions) and its impact on the environment and responsibility for own decisions in short and long-term aspect. - [K1A_K02]

3. Is able to identify and resolve the dilemmas associated with the profession, among others. problems at the technology/environment level. - [K1A_K06]

Assessment methods of study outcomes

-Lecture ? examination.

Laboratory ? individual exercises passing.

Course description

-Types, classification and structure of storing devices. Calculation of dimensions of pallet, flow and cantilever racks and shelving. Types, classification and structure of internal transportation means, including forklift trucks (with AGV vehicles, Teach-in technology), cranes (especially stacker cranes and AS/RS systems), conveyors, manipulators and robots. Calculation of quantity of different types of forklift trucks and stacker cranes in warehouses. Modern technologies concerning picking realization in warehouse conditions (including including pick by voice, pick by light, pick-n-go, horizontal and vertical carousels, vertical lifts etc.). Elements of automatic identification and a electronic data interchange (including bar codes and RFID technologies).

Basic bibliography:

1. Korzeń Z.: Logistyczne systemy transportu bliskiego i magazynowania, Tom I: Infrastruktura, technika, informacja, Inst. Logistyki i Magazynowania, Poznań, 1998

2. Korzeń Z.: Logistyczne systemy transportu bliskiego i magazynowania, Tom II: Projektowanie, modelowanie, zarządzanie, Inst. Logistyki i Magazynowania, Poznań, 1998

3. Frazelle E.H.: World-class warehousing and material handling, Logistics Management Library, McGraw-Hill Companies, 2002

4. Wojciechowski Ł., Wojciechowski A., Kosmatka T.: Infrastruktura magazynowa i transportowa, Wyd. WSL, Poznań, 2009

5. Tompkins J.A., Smith J.D. [red.]: The warehouse management handbook, Tompkins Press, Raleigh, 1998.

Additional bibliography:

1. Fiałkowski J.: Technologia magazynowania. Wybrane zagadnienia. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1995

2. Fertsch M. [red.]: Podstawy logistyki, Inst. Logistyki i Magazynowania, Poznań, 2006

3. Długosz J. [red.]: Nowoczesne technologie w logistyce, PWE, Warszawa, 2009

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	30
2. Participation in exercises	15
3. Consultation	8
4. Knowledge strengthening	2
5. Preparing to exam and assessment	15
6. Participation in exam and assessment	2

Student's workload

Source of workload	hours	ECTS
Total workload	87	4
Contact hours	45	4
Practical activities	15	0