COURSE DESCRIPTION CARD - SYLLABUS

Course name
Simulation in Logistics I [N2Trans1-LogTr>SwL1]

Course

Field of study
Transport

Year/Semester
1/1

Area of study (specialization)
Logistics of Transport

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
18

Laboratory classes
9

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Hanna Sawicka
hanna.sawicka@put.poznan.pl

Lecturers

Prerequisites

Knowledge: the student has basic knowledge of inventory management, methods of shaping the distribution network of goods and the functioning of internal transport. Skills: the student is able to think analytically and interpret the described phenomena. Social competencies: the student is aware of the role and importance of making the right decisions and of problems related to logistics.

Course objective

Presentation of the main factors determining the proper design of internal (in warehouse facilities) and external (distribution network) logistics. The subject matter of the classes also includes the acquisition of practical skills in simulation modeling of logistic phenomena and solutions.

Course-related learning outcomes

Knowledge:
The student has a structured and theoretically founded general knowledge related to key issues in the field of transport engineering.
The student has an advanced and a detailed knowledge of the processes occurring in the life cycle of transport systems.

The student knows advanced methods, techniques and tools used in solving complex engineering tasks and carrying out research in a selected area of transport.

Skills:
The student is able to plan and conduct experiments, including measurements and simulations, interpret the obtained results and draw conclusions as well as formulate and verify hypotheses related to complex engineering problems and simple research problems.
The student is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems.
The student is able - when formulating and solving engineering tasks - to integrate knowledge from various transport areas (and if necessary also knowledge from other scientific disciplines) and apply a system approach, also taking into account non-technical aspects.

Social competences:
The student understands that in the field of transport engineering, knowledge and skills quickly become obsolete.
The student understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems.
The student understands the importance of popularizing activities regarding the latest achievements in the field of transport engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Activity during lectures and laboratories and ongoing preparation for classes. Implementation of laboratory tasks individually and in groups. Test of knowledge verifying learning outcomes.

Programme content

The course consists of the following topics:
1. Simulation as a tool for design and analysis.
2. Modeling of human and material resources.
3. Functional design of a warehouse facility.
4. Construction of a hierarchical simulation model.
5. Customer service system.
6. Simulation design of transportation.
7. Simulation design in logistics.

Course topics

1. Introduction to the subject, including the definition of the terms: logistics design, micro and macro design, criteria for the division of logistic objects, classification of logistic objects, dimensioning of the logistic chain, types of transport and logistics networks, main functions performed in logistic objects, processes of goods flow through logistic objects.
2. Methodology of simulation design - design principles, main stages, practical tips.
3. Presentation of the ExtendSim simulation tool: workspace, libraries of objects, types of flows, object control parameters, principles of model construction, presentation of an example tool application - the case of packing finished products. Building a simulation model, parameterization of the model, conducting experiments, interpretation of the solution (laboratory classes).
4. Construction of a conceptual model of a warehouse, selection of objects for modeling key goods flows (human resources, handling devices / means of transport, pallet places, etc.); case study - order picking model, case study - replenishment model. Building a simulation model, parameterization of the model, conducting experiments, interpretation of the solution (laboratory classes).
5. Construction of a conceptual model of the transport system, selection of elements and their parameterization (means of transport, routes, speeds, etc.). Case study of the operation of a gas station. Building a simulation model, parameterization of the model, conducting experiments, interpretation of the solution (laboratory classes).
6. Building hierarchical models, customer service system – probability distribution analysis.

7. Construction of a conceptual model of the supply chain, selection of objects for simulation modeling; manufacturer-distributor-retailer case study. Building a simulation model of the supply chain, parameterizing objects, conducting experiments, interpreting solutions. Assessment of the solution, proposal of the supply chain redesign, assessment of changes (laboratory classes).
8. Contemporary trends in simulation modeling, including optimization in simulation.

Teaching methods

1. Problem lecture with a multimedia presentation.
2. Case study.
3. Laboratories - computational experiments.

Bibliography

Basic
1. Leszczyński J.: Modelowanie systemów i procesów transportowych. Wydawnictwo Politechniki Warszawskiej, Warszawa, 1990 (in Polish).
2. Law A.M., Kelton W.D.: Simulation modeling and analysis. McGraw-Hill. Boston, 2000.
3. Sawicka H.: Symulacje w logistyce. Materiały wykładowe, Politechnika Poznańska (in Polish).
Additional
1. Gubała M., Popielas J.: Podstawy zarządzania magazynem w przykładach. Instytut Logistyki i Magazynowania, Poznań, 2005 (in Polish).
2. Pfohl H-Ch.: Systemy logistyczne: podstawy organizacji i zarządzania. Instytut Logistyki i Magazynowania, Poznań, 1998 (in Polish).

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	3,00
Classes requiring direct contact with the teacher	27	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	23	1,00