COURSE DESCRIPTION CARD - SYLLABUS

Course name
Transportation systems management [S2Log2E-SL>ZST]

Course

Field of study
Logistics

Year/Semester
1/2

Area of study (specialization)
Logistics Systems

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
30

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Student has a basic background in transportation, logistics and management. He/ she can carry out analytical tasks and manage projects as well as apply basic management tools and methods in transportation and logistics. He/ she is able to perform a team work.

Course objective

To familiarize students with the basic concepts and terms associated with transportation and transportation systems. Provide rules and tools/ methods to design, evaluate and manage Transportation Systems.

Course-related learning outcomes

Knowledge:
1. Student knows dependencies in the transportation systems management area and their relations with logistics [P7S_WG_01]
2. Student knows issues of process mapping, process orientation and process simulation within transportation systems management [P7S_WG_03]
3. Student knows extended concepts for transportation systems management [P7S_WG_05]
4. Student knows the detailed methods, tools and techniques characteristic of the transportation

systems management in logistics [P7S_WK_01]

Skills:
1. Based on the literature review and analysis of other sources of information, student can collect and provide, in an orderly manner, information on the problem within the framework of transportation systems management [P7S_UW_01]
2. Student can design, using appropriate methods and techniques, the object, system or logistic process within transportation systems management and the process associated with it including defining the path of its implementation and potential threats or limitations in analyzed domain [P7S_UW_05]
3. Student is able to design, using properly selected means, an experiment, analytical process or scientific research project/ program solving a problem within transportation systems management and its specific issues [P7S_UK_01]
4. Student can identify changes in requirements, standards, regulations, technological development and behaviour of the labor market. Based on their recognition he/she is able to determine the needs to extend and enhance his/ her own and others' knowledge within transportation systems management [P7S_UU_01]

Social competences:
1. Student can recognize causal relationships in achieving the set goals and grading the significance of alternative or competitive tasks in the field of transportation systems management [P7S_KK_01]
2. Student is aware of his/her responsibility and initiation of activities related to the formulation and information sharing and cooperation in the society in the scope of transportation systems management [P7S_KO_02]
3. Student is responsible for his/ her own work and ready to comply with the rules of working in a team and taking responsibility for the tasks carried out jointly in the scope of transportation systems management [P7S_KR_01]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Formative assessment: homeworks, discussions summarizing individual lectures, giving the student the opportunity to assess the understanding of the problem, active participation in lectures. Fiinal assessment: 45 minute, written exam in the subject , test composed of 25 questions (closed and open); satisfactory threshold - 50%.
Project: Formative assessment: assessment of class activities, active participation in classes. Final assessment: grading the project in the field of decision making and aiding in logistics, evaluation of the student's skills in mathematical modeling of the decision problem and his/ her ability to perform computational experiments.

Programme content

The essence of transportation systems and the rules of managing them. Design and development of transportation systems as well as their control/ monitoring. Management rules for the major components of the transportation systems.

Course topics

Lecture: Introduction to the topic. The definition of transportation, transportation systems and transportation systems management. Content of the lecture. Definition and basic characteristics of Transportation Systems. Major components of Transportation Systems and their description. Classification of Transportation Systems. Single-mode and multimodal Transportation Systems. System Approach for Transportation Systems Analysis. Transportation System as an object. Passengers' vs. Freight Transportation Systems. Description, basic features and existing interactions between basic elements of Transportation Systems: Infrastructure, Fleeet, People (Crew), Rules/ Regulations, Processes. Presentation of different infrastructural solutions in Transportation Systems. Linear and Point infrastructure. Analysis of road-, railway-, sea- and air- transportation infrastructure. Characteristics of different categories of fleet operating in Transportation Systems. Analysis of fleet operating in road-, railway-, sea- and air- Transportation Systems. Description of crews serving Transportation Systems and rules/ regulations controling the operations of Transportation Systems. Analysis concerning road-, railway-, sea- and air- Transportation Systems. Basic processes (business and technological) carried out

in Transportation Systems. Process analysis of selected transportation processes. Major decision problems arising in Transportation Systems - their features and solution procedures. Classification of transportation decision problems. Solving selected categories of decision/ management problems arising in Transportation Systems: network design, location analysis, fleet composition, crew assignment and scheduling, customer service. Principles of Transportation System design, management and evaluation. Desription of the available tools and methods (e.g. Visum, Vissim, Multiple Criteria methods, Cost-Benefit methods). Transportation Systems development: land use desgn, infrastructure development, implementation of management rules, information provision, design of pricing strategies. Stages of Transportation System design/development: analysis of transportation demand, design of a transportation network, traffic assignment, definition of transportation modes (types of vehicles), allocation of crews. The principles of a 4-stage model. Intelligent Transportation Systems (ITS). Basic concepts and features. Selected examples of ITS-s world wide. Case study analysis. Cases concerning design, operations and management of selected Transportation Systems.
Project: Introduction to the project. Characteristics and major rules of the project preparation. Description of the basic rules of transportation systems design and redesign. Selection of Transportation Systems to be designed/ redesigned and evaluated within the projects. Analysis of selecetd components of a transportation system - passenger or freight. Application of a 4-stage model to design/ redesign of a transportation system. Demand analysis - definition of the O-D matrix; design of a transportation network, traffic assignment to the network; definition of transportation modes (types of vehicles) and allocation of crews. Performing a series of traffic simulations. Analysis of selected transportation solutions. Evaluation of considered solutions. Definition of evaluation parameters/ criteria. Modeling of the DM's preferences. Computational experiments - multiple criteria ranking of solutions. Selection of the compromise solution.

Teaching methods

Lecture: conversatory lecture; interactive discussion; case studies.
Project: project method; practical analysis of the design problem; computational experiments.

Bibliography

Basic:
1. Bierlaire M. (Eds.), Integrated Transport and Land Use Modeling for Sustainable Cities, Routledge, New York, 2014.
2. Hensher D., Button K. (Eds.), Handbook of Transport Modelling, Pergamon, Amsterdam - New York - Tokyo, 2005.
3. Daganzo C., Fundamentals of Transportation and Traffic Operations, Pergamon Press, New York, 1997.

Additional:
1. Tumlin J., Sustainable Transportation Planning. Tools for Creating Vibrant, Healthy, and Resilient Communities, Wiley, San Francisco - Toronto, 2012.
2. Żak J., Hadas Y., Rossi R.(Eds.), Advanced Concepts, Methodologies and Technologies for Transportation and Logistics, Springer, Heidelberg, 2018.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50