COURSE DESCRIPTION CARD - SYLLABUS

Course name

Computer-aided logistics processes

Course

Field of study

Transport

Year/Semester

3/5

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Civil and Transport Engineering

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

KNOWLEDGE: The student has a general knowledge of the organization and operation of transport companies, knows the basic IT tools

SKILLS: The student is able to identify decision problems and indicate the areas of application of IT tools, uses office applications

SOCIAL COMPETENCES: The student is aware of the possibility of creating a competitive advantage through the use of modern information technologies

Course objective

Acquainting with modern computer systems based on GIS technology, used to support decisions in

transport companies at all management levels. As part of the laboratories, the possibilities and methods of effective use of modern technologies with computer aided solving of typical transport problems will be indicated.

Course-related learning outcomes

Knowledge

The student has ordered and theoretically founded general knowledge in the field of key issues of technology and detailed knowledge in the field of selected issues in this discipline of transport engineering

The student knows the basic techniques, methods and tools used in the process of solving tasks in the field of transport, mainly of an engineering nature engineering

Skills

The student can properly use information and communication techniques, applicable at various stages of the implementation of transport projects

The student is able, when formulating and solving tasks in the field of transport, to apply appropriately selected methods, including analytical, simulation or experimental methods

The student is able to assess the computational complexity of algorithms and transport problems

Social competences

The student understands that in technology, knowledge and skills very quickly become obsolete

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Assessment of student activity during laboratory classes; assessment of the degree of implementation of laboratory tasks on the basis of the submitted reports and generated result files.

Assessment taking into account the activity of students during lectures and a test of the material studied (checking the understanding of basic concepts and knowledge of the issues covered by the program of the course).

Programme content

1. Introduction to the issues of computer-aided logistics: Formulating a decision problem, building a mathematical model, determining a solution, evaluating a solution, making decisions. The laboratory exercises include the implementation of a few simple tasks using a spreadsheet and an optimization supplement.

2. Basic concepts, areas of application, direction of development of contemporary Geographic Information Systems. Methodology of using GIS systems in solving optimization and decision problems. During the laboratory classes, it is planned to solve a selected problem with and without the use of a GIS system, and then a comparative analysis of the solutions obtained and the advantages and disadvantages of both approaches.

3. GIS as an analytical tool: Basic concepts, methodology of using Geographic Information Systems as an analytical tool. An exemplary analysis of the route and impact of communication lines in a selected city. Analysis of the effects of road infrastructure modifications. During the laboratory classes, an analysis of the extension of travel times is planned due to the organization of demonstrations on selected streets in the example city.

4. Computer-aided operational activities: Classification and characteristics of various areas of application of computer-aided decision-support systems. Identification of problems at the operational level. Analysis of the problem of vehicle routing. Variants and methods of solving. During the laboratory classes, it is planned to formulate, solve and analyze a specific problem of vehicle routing, taking into account time windows and a non-homogeneous fleet.

5. Computer-aided strategic activities: Identification and characterization of problems at the strategic level. Integration of transactional and analytical systems. Analysis of the problem of locating a logistics center. Variants and methods of solving. During the laboratory classes, a solution to the localization problem is planned, preceded by an analysis of sample operational data.

6. Evolution of systems: Development of optimization systems using nondeterministic approaches. Evolution of optimization algorithms. Artificial intelligence, genetic and ant algorithms, cellular automata. One and multi-criteria approach. Closed and open systems.

7. Advanced technologies in transport management: Satellite methods of locating objects and techniques of using the GPS system for fleet management. Possibilities and limitations of commercial vehicle fleet management systems. Problems with integrating services from different providers

Teaching methods

1. Lecture with multimedia presentation

2. Laboratories - creating solutions that illustrate the issues discussed during lectures using simple (spreadsheet) and advanced systems for modeling and optimization of transport systems (TransCAD)

Bibliography

Basic

1. Bielecka E., Systemy Informacji Geograficznej - teoria i zastosowania, Wydawnictwo PJWSTK, Warszawa 2006

2. Długosz J. : Nowoczesne technologie w logistyce. PWE, Warszawa 2009

3. Szapiro T. (red.), Decyzje menedżerskie z Excelem. Wydawnictwo PWE, Warszawa 2000.

Additional

1. Michalewicz Z.: Algorytmy genetyczne + struktury danych = programy ewolucyjne, Wyd. Naukowo-Techniczne Warszawa 2003

2. Leyland V.: EDI Elektroniczna wymiana dokumentacji, Wydawnictwa Naukowo-Techniczne, Warszawa 1995

3. Narkiewicz J. : GPS. Budowa, działanie, zastosowanie. WKŁ, Warszawa 2002

4. Kubicki J., Kuriata A.: Problemy logistyczne w modelowaniu systemów transportowych, Wyd. WKŁ Warszawa 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests) [1]	40	1,5

[1] delete or add other activities as appropriate