COURSE DESCRIPTION CARD - SYLLABUS

Course name
Decision aiding in transport [S2Trans1E-TrZ>WDwT]

Course

Field of study
Transport

Year/Semester
1/2

Area of study (specialization)
Sustainable Transport

Profile of study
general academic

Level of study
second-cycle

Course offered in
english

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Knowledge: the the student has a basic knowledge of transport, its role in the economy and society. Skills: the student is able to interpret phenomena occurring in organizations, formulate opinions, draw conclusions. Social competencies: the student is able to work in a group, shows independence in solving problems, acquiring and improving the knowledge.

Course objective

Learning the concepts of decision aiding and making in the field of transport, including decision problems, how to solve them and implement improvements in transport companies.

Course-related learning outcomes

Knowledge:
Student has an advanced detailed knowledge of selected issues in the field of transport engineering.
Student knows advanced methods, techniques and tools used in solving complex engineering tasks and carrying out research in a selected area of transport.

Skills:

Student is able - when formulating and solving engineering tasks - integrate knowledge from various areas of transport (and, if necessary, also knowledge from other scientific disciplines) and apply a systemic approach, also taking into account non-technical aspects.
Student is able - using among others conceptually new methods - solve complex tasks in the field of transport engineering, including atypical tasks and tasks with a research component.

Social competences:
Student understands that in the field of transport engineering, knowledge and skills very quickly become obsolete.
Student understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Activity during lectures, including participation in discussions and ongoing preparation for classes. Workshops consisting of team solving a given decision problem. In the laboratory classes part: activity during classes and ongoing preparation for classes. Implementation of laboratory tasks individually and in groups. Periodic checking of preparation for classes in writing. In the project part: implementation and presentation of transport system projects, subject to multicriteria evaluation, along with the computational experiments and the analysis of the obtained results. Written exam to verify the learning outcomes.

Programme content

Lectures and laboratory classes are closely related. On the basis of the content presented during the lectures, the tasks (in most cases problematic, based on case studies) are performed during the laboratory classes.
1. Reminder of key concepts related to the decision-making process; introduction to issues related to decision problems in transport and how to solve them. Presentation of the main thematic areas and discussion of the detailed program of activities.
2. Decision problem analysis. The essence of decisions made in transport. Basic entities involved in the decision-making process and their impact on the decision aiding process. Case study.
3. Types of decision problems in transport, their essence and characteristics. Creating a mathematical model for the ranking problem, including evaluation criteria, a performance matrix and a model of decision maker"s preferences. Case study.
4. Characteristics of various methodological trends in the area of decision aiding methods. Presentation of selected decision aiding methods. Solving decision problems with the application of various decision aiding methods.
5. Selection of the most suitable method allowing to solve a decision problem - basic stages. Sensitivity analysis. Case study.
6. The application of a selected method to solve a decision problem in a transport company. Workshops.
7. Summary of lectures and laboratory classes. Written exam.
Projects
1. Introduction to the project, including definition of the purpose and the scope of the course. A reminder of the basic information on decision aiding and decision model design with an application of decision aiding methods.
2. Presentation of the concepts of projects implemented by students, including: general characteristics of the modeled transport systems, definition of decision problems, presentation of the analyzed processes in the form of flowcharts.
3. Presentation of the individual stages of the project implementation - data, selection of the most suitable decision aiding method and computational experiments. Discussion of the problems that occur.
4. Final presentations of transport systems projects - assumptions, decision model, analysis of research results.

Teaching methods

1. Problem lecture with a multimedia presentation.
2. Case study.

2. Workshop methods.
4. Laboratory classes - computational experiments.
5. Project method - individual or team implementation of a large, multi-stage practical task, the result of which is the creation of a work in the form of a solved decision problem with analyzes.

Bibliography

Basic
1. Belton V., Stewart T.J.: Multiple Criteria Decision Analysis. An Integrated Approach. Kluwer Academic Publishers, London, 2002.
2. Sawicka H.: Decision Making in Transport. Lecture materials, Poznan University of Technology
3. Vincke P.: Multicriteria Decision-Aid. John Wiley & Sons, Chichester, 1992.
Additional
1. Keeney R., Raiffa H.: Decisions with Multiple Objectives. Preferences and Value Tradeoffs. Cambridge University Press, Cambridge, 1993.
2. Lotfi V., Pegels C.: Decision Support Systems for Management Science / Operations Research. Irwin, Homewood-Boston, 1989.
3. Roy B.: Multicriteria Methodology for Decision Aiding. Springer Science+Business Media, Dordrecht, 1996.
4. Saaty T.L.: The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation, Mc-Graw Hill, New York, 1980.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00