COURSE DESCRIPTION CARD - SYLLABUS

Course name
Operational research [S1Trans1>BO]

Course

Field of study
Transport

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Student starting this course has basic knowledge of mathematical analysis, probability and mathematical statistics. Student is fluent using office computer programs. Student is aware of the costs of making non-optimal decisions. Student knows how to manage the time available to perform the tasks indicated for the implementation.

Course objective

Getting to know methods and acquiring practical skills in solving problems falling within the scope of the following areas of operations research: theory of mass service, resource management, linear and nonlinear programming

Course-related learning outcomes

Knowledge:
The student has an extended and deepened knowledge of mathematics useful for formulating and solving complex technical tasks concerning various means of transport
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

Skills:
The student is able to properly plan and conduct perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions
The student has the ability to formulate tasks in the field of transport engineering and their implementation using at least one of the popular tools

Social competences:
The student is aware of the importance of knowledge in solving engineering problems, knows examples and understands the causes of malfunctioning transport systems that have led to serious financial and social losses or to serious loss of health and even life

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
The knowledge acquired during the lecture is checked on the basis of an exam in writing.
Completion of the content of the tutorials is based on the results of one written test held during the last classes. The test consists of 8-10 questions (closed and open-ended) with different scores.

Programme content

Introduction to the subject matter. Program, hour structure, literature, course of credit. Basic concepts related to mass service systems. Methods of researching mass service systems. Generation of pseudo-random numbers with selected probability distributions. Descriptive method of modeling (testing) the mass service system. Static optimization methods - optimization task, objective function, searching for the optimal solution. Statistical methods of static optimization and deterministic methods of static optimization. Application of static optimization methods to solve example problems related to with mass handling systems e.g. Monte Carlo method. Basic issues of resource inventory control. Deterministic models of resource inventory control. Stochastic models of resource inventory control. Methods of searching for preliminary solutions and admissible base solutions; closed and open transport task. Ways of solving decision problems with the methods of games with nature. Methods of dynamic programming on the example of the problem of resource distribution, determination of the shortest path through the network and optimization of the structure of the maintenance cycle.
Tutorials. Consolidating knowledge of methods and acquiring practical skills in the implementation of selected algorithms for solving decision problems falling within the scope of the theory of mass service, resource management and static optimization.

Teaching methods

Lecture: with the use of multimedia presentations and computer applications.
Tutorials: electronic presentations in the stages of formulating problems to be solved and presenting the final results, solving fragments of problems on the board by the teacher and / or students.

Bibliography

Basic
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Additional
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6. Krawczyk S., Badania operacyjne dla menedżerów. Wyd. Akademii Ekonomicznej we Wrocławiu, Wrocław, 1996.
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Breakdown of average student's workload

	Hours	ECTS
Total workload	80	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)	35	1,00