STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Management of Road Transportation Systems**		Code **1010612231010610358**

Field of study **Transport**	Profile of study (general academic, practical) **(brak)**	Year /Semester **2 / 3**

Elective path/specialty **Road Transport**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**

Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**

No. of hours				No. of credits
Lecture: **2** Classes: **-** Laboratory: **-** Project/seminars: **1**				**3**

Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**

Education areas and fields of science and art **technical sciences**	ECTS distribution (number and %**)** **3 100%**

Responsible for subject / lecturer:	Responsible for subject / lecturer:
Adam Redmer, Eng. PhD email: adam.redmer@put.poznan.pl tel. 61 665 21 29 Faculty of Machines and Transport ul. Piotrowo 3, 60-965 Poznań	Paweł Zmuda-Trzebiatowski, Eng. MSc email: pawel.zmuda-trzebiatowski@put.poznan.pl tel. 61 665 27 16 Faculty of Machines and Transport ul. Piotrowo 3, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	student has a basic knowledge of mathematics and operational research moreover transportation and management as well
2	**Skills**	student is able to accumulate information, interpret it, reasoning based on it, express and justify opinions, identify, associate and interpret phenomena occurring in a practice
3	**Social competencies**	student is aware of the importance and understands non-technical aspects and effects of transportation processes, including those coming from transportation management

Assumptions and objectives of the course:

to prepare students for management of transportation systems and make them familiar with single and multicriteria methods that allow for optimization of real life transportation systems.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Students know the notion of the optimization (single and multiple criteria) and the decision making. - [K2A_W01]

2. Students know steps of optimization and decision making processes. - [K2A_W01]

3. Students know and understand make or buy, currier selection, fleet sizing/composition and replacement decision problems. - [K2A_W02]

4. Students know principles of the optimization and the mathematical modeling. - [K2A_W02]

5. Students know principles of the Multicriteria Decision Making / Aid ? MCDM/MCDA. - [K2A_W04]

6. Students know methods and tools of the optimization (solver) and the decision making (AHP. ELECTRE, LBS, UTA). - [K2A_W04]

Skills:

1. Students are able to carry out optimization and decision making processes. - [K2A_U04]

2. Students are able to construct optimization / mathematical model of a problem and a decision maker preference model as well. - [K2A_U05]

3. Students are able to select appropriate solution methods to models / problems. - [K2A_U06]

4. Students are able to apply optimization and decision making / aid tools (software). - [K2A_U05]

5. Students are able to asses obtained results and to recommend ways of their application. - [K2A_U14]

Social competencies:

1. Students are aware of the significance of making wright / the best possible / optimal decisions in business practice. - [K2A_K02]

2. Students are aware of potential technical, economic and social effects that an improper / incorrect decision making / problems solving may cause. - [K2A_K04]

3. Students are able to develop independently their knowledge of operational research, optimization and MCDM/MCDA. - [K2A_K05]

Assessment methods of study outcomes

A final exam based on the knowledge obtained within the lectures (a multiple choice test).

Course description

The notion of the optimization and the decision making: introduction to the optimization and decision making (definitions, meanings) ? multiple criteria in decision making ? the essence of the compromise solutions.

Single criterion optimization: principles of the mathematical modeling, utilization of optimization tools, basic algorithms.

Make-or-buy problem: the definition and the essence of the make-or-buy problem in transportation / logistics (in-house or outside logistics, in-house or outside transport).

Fleet sizing/composiotion problem: the definition of the fleet sizing/composition problem; the essence and characteristic of the problem; factors influencing fleet size /composition.

Multiple criteria optimization: principles of the multiobjective optimization, Pareto-optimal solutions of problems, methods of generating / seeking for Pareto optimal solutions.

Multicriteria Decision Making / Aid ? MCDM/MCDA: the definition and the essence of the MCDM/MCDA, classification of MCDM/MCDA methods; principles of decision maker?s preferences modeling; selection of an appropriate MCDM/MCDA tools; an application of MCDM/MCDA methods to a ?buy? option ? carriers selection and assessment; a ?make? option ? fleet replacement.

Logistic solutions for SME sector: case study; designing of a logistic solution for a given SME.

Basic bibliography:

1. Sikora W. (red.): Badania operacyjne. Polskie Wydawnictwo Ekonomiczne, Warszawa 2008.

2. Hillier F., Lieberman G.: Introduction to Operations Research. McGraw Hill Publishing, New York 2002

3. Wagner H.: Badania operacyjne: zastosowania w zarządzaniu. Polskie Wydawnictwo Ekonomiczne, Warszawa 1980.

4. Figueira J., Greco S., Ehrgott M. (eds.): Multiple Criteria Decision Analysis. State of the Art. Surveys. Springer, New York 2005.

5. Żak J.: Wielokryterialne wspomaganie decyzji w transporcie drogowym. Rozprawy, Nr 394, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005.

Additional bibliography:

1. Jędrzejczak Z., Kukła K., Skrzypek J., Walkosz A.: Badania operacyjne w przykładach.

2. Jacyna M.: Modelowanie wielokryterialne w zastosowaniu do oceny systemów transportowych.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	30
2. Participation in laboratories	15
3. Individual work (homework and preparation to a final exam)	15

Student's workload

Source of workload	hours	ECTS
Total workload	60	3
Contact hours	45	2
Practical activities	15	1