STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Operation research and optimization theory	**1011105321011137646**

Field of study	Profile of study (general academic, practical)	Year /Semester
Logistics - Part-time studies - Second-cycle	**(brak)**	**1 / 2**

Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Chain of Delivery Logistics	**Polish**	**obligatory**

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

No. of hours				No. of credits
Lecture: **14** Classes: **12** Laboratory: **-** Project/seminars: **-**				**3**

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

Education areas and fields of science and art	ECTS distribution (number and %**)**

Responsible for subject / lecturer:

dr Tomasz Brzęczek
email: tomasz.brzeczek@put.poznan.pl
tel. 61 665 33 92
Wydział Inżynierii Zarządzania
ul. Strzelecka 11 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student knows economic terms and management problems, esppecially operation management problems.
2	**Skills**	Student has Excel and computer skills. Makes basic operations of matrix algebra.
3	**Social competencies**	Student works on his own and in a group.

Assumptions and objectives of the course:

To develop skills of input-output modeling in management systems and optimization skills. To deliver knowledge about methods of management optimization and methods of estimation of an economic model.

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

Knowledge:

1. Knows problems of production structure, mixture and schedulling. - [K2A_W01]

2. Knows transshipment problems. - [K2A_W01]

3. Student knows typical optimization problems in logistics, their objectives and constraints. - [K2A_W09]

4. Knows multi criteria optimization methods. - [K2A_W13]

5. Knows optimization methods with continous and descrete variable. - [K2A_W22]

Skills:

1. Student uses Excel's Solver. - [K2A_U05]

2. Student analyse chosen problems by himself - [K2A_U08]

3. Uses optimization methods: graphical, simplex and transportation algorithm. - [K2A_U10,]

4. Uses multi objective methods (objectives hierarchy, metacriterion, fulfillment degre, AHP). - [K2A_U10]

5. Student builds input-output model of economic system effectiveness. - [K2A_U14]

6. Explains results of optimization models and uses them in logistics. - [K2A_U15]

Social competencies:

1. Student is aware of optimization benefits in logistics and planning. - [Such a course effect was not assumed]

Assessment methods of study outcomes

Formulating mark from exercises and from lecture concerning current work of a student and the results of a homework

End mark (pass):

a) lecture pass based on results of current work and activity, and results of written tests in theory and tasks solving,

b) exercise pass based on results of current work and activity, and results of written tests in theory and tasks solving.

Course description

1. Clasification and modeling of decision tasks. Problems of production structure, mixture, resource division, transportation and tasks allocation.

2. Linear programming. Simplex and graphical method.

3. Multi-criteria continous programming. Metacriterion, objectives hierarchy.

4. Multi-criteria integer programming. Fulfillment degre, AHP.

5. Net programming. CPM ? critical path method. PERT-program evaluation and review technique.

6. Transshipment optimization problems.

7. Decisions under risk.

DYDACTIC METHODS:

Lecture: lecture with a problem analysis

Exercise: exercises in tasks, case study analysis

Basic bibliography:

1. Anholcer M., Gaspars H., Owczarkowski A., Ekonometria z Excelem Wyd. UEP, Poznań 2010.

2. Badania operacyjne, Sikora W. (red.), PWE, Warszawa 2008.

3. Brzęczek T., Gaspars-Wieloch H., Godziszewski B., Podstawy badań operacyjnych i ekonometrii, Wydawnictwo PP, Poznań 2010.

4. Przykłady i zadania z badań operacyjnych i ekonometrii, Sikora W. (red.), Wyd. UEP, seria MD 163, Poznań 2005.

Additional bibliography:

1. Józefowska J., Badania operacyjne i teoria optymalizacji, Wydawnictwo PP, Poznań 2011.

2. Trzaskalik T., Wprowadzenie do badań operacyjnych z komputerem - CD, PWE, Warszawa 2008.

3. Węglarz J., Modelowanie i optymalizacja. Badania operacyjne i systemowe, Exit, Warszawa 2003.

Result of average student's workload

Activity	Time (working hours)
1. lecture	14
2. exercise classes	12
3. consultation	24
4. preparing to classes and tests	25

Student's workload

Source of workload	hours	ECTS
Total workload	75	3
Contact hours	28	2
Practical activities	12	1