STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Operational Research and Econometrics**	Code **1011102311011134996**	
Field of study **Engineering Management - Full-time studies -**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 1**
Elective path/specialty **Enterprise Management**	Subject offered in: **English**	Course (compulsory, elective) **obligatory**

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

No. of hours Lecture: **15** Classes: **15** Laboratory: **15** Project/seminars: **-**	No. of credits **3**

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

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

Responsible for subject / lecturer:	Responsible for subject / lecturer:
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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 in team and prepares project.

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 econometric model.

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

Knowledge:

1. Student knows typical optimization problems in management, their objectives and constraints. - [K2A_W01]

2. Knows problems of production structure, mixture and schedulling. - [K2A_W09]

3. Knows allocation problems for tasks, resources, travel route and for transport plan problem. - [K2A_W09]

4. Knows optimization methods with continous and descrete variable and linear or non-linear function. - [K2A_W09]

5. Knows multi criteria optimization methods. - [K2A_W09]

6. Knows ordinary least squares method. - [K2A_W10]

Skills:

1. Student builds input-output model of economic system effectiveness. - [K2A_U01]

2. Uses optimization methods: graphical, simplex, graphs and transportation algorithm. - [K2A_U04,]

3. Student estimates or optimizes models with Excel, GRETL and Solver (inc. Solver Foundation). - [K2A_U07]

4. Uses multi criteria methods (aims hierarchy, metacriterion, fulfillment degre, AHP). - [K2A_U04]

5. Estimates linear and linaerizable econometric models with OLS. - [K2A_U04]

6. Explains results of optimization and econometric models and uses them in management. - [K2A_U02]

Social competencies:

1. Student is aware of optimization benefits in management and planning. - [K2A_K03]

2. Spreads optimization in management problem solving. - [K2A_K05]

3. Can objectively assess and analyze data and solutions of management problems. - [S2A_K06]

Assessment methods of study outcomes

Partial mark:

a) task solving at lecture and exercise classes

b) solving Excel case studies

Pass mark:

a)Lecture and exercises pass mark based on partial marks and results of written test of tasks solving.

b) Laboratory pass mark based on partial marks and results of case studies to be solved using a computer.

Course description

1. Estimation of linear and linearizable econometric models with OLS.

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

3. Linear programming. Simplex and graphical method.

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

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

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

7. Transportat optimization problem and Little algorithm.

8. Decisions under risk. Decision trees, a newsboy problem.

DYDACTIC METHODS: lecture with problem analysis, exercises, case study.

Basic bibliography:

1. Balakrishnan N., Render B., Stair RM., Managerial Decision Modeling with Spreadsheets, Pearson Education 2006.

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

3. Maddala G.S., Lahiri K., Introduction to Econometrics 4-th edition, Wiley 2009.

4. Ravindran A.R. (ed.), Operations Research and Management Science Handbook, 904 p., Operations Research Series, CRC Press 2007.

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

6. Taha H.S., Operations Research: An Introduction (8-th Edition), 813 p., 2006 (with AMPL and Excel Solver examples).

Additional bibliography:

1. Krajevski LJ., Ritzman LP., Malhorta MK., Operations Management, Prentice Hall Int., 2006.

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

3. Winston W.L., Operations Research: Applications and Algorithms (with CDrom and InfoTrac) 1440 p., Duxbery Press 2003.

Result of average student's workload

Activity	Time (working hours)
1. Lectures	15
2. Exercises	15
3. Laboratories	15
4. Consulting	2
5. Own studies preparing to classes and passes	30

Student's workload

Source of workload	hours	ECTS
Total workload	77	3
Contact hours	47	2
Practical activities	30	1