

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Operational Research and Econometrics		Code 1011102211011134996
Field of study Engineering Management - Full-time studies -	Profile of study (general academic, practical) general academic	Year /Semester 1 / 1
Elective path/specialty Quality Systems and Ergonomics	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 Lecture: 15 Classes: 15 Laboratory: 15 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art social sciences		ECTS distribution (number and %) 3 100%
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, especially 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 a 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 scheduling. - [K2A_W09]		
3. Knows allocation problems for tasks, resources, travel route and for transport plan problem. - [K2A_W09]		
4. Knows optimization methods with continuous and discrete 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 degree, AHP). - [K2A_U04]		
5. Estimates linear and linearizable 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 tree and 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. Brzeczek T., Gaspars-Wieloch H., Godziszewski B., Podstawy badan operacyjnych i ekonometrii, Wydawnictwo PP, Poznan 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 badan operacyjnych i ekonometrii, Sikora W. (red.), Wyd. UEP, seria MD 163, Poznan 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	1
Practical activities	30	1