

| <b>STUDY MODULE DESCRIPTION FORM</b>   |   |   |
|--|---|---|
| Name of the module/subject<br><b>Operational Research and Econometrics</b>   |   | Code<br><b>1011105311011134996</b>  |
| Field of study<br><b>Engineering Management - Part-time studies -</b>  | Profile of study (general academic, practical)<br><b>(brak)</b> | Year /Semester<br><b>1 / 1</b>  |
| Elective path/specialty<br><b>Marketing and Company Resources</b>  | Subject offered in:<br><b>Polish</b>                            | Course (compulsory, elective)<br><b>obligatory</b>  |
| Cycle of study:<br><b>Second-cycle studies</b>   | Form of study (full-time, part-time)<br><b>part-time</b>        |   |
| No. of hours<br>Lecture: <b>16</b> Classes: <b>14</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>  |   | No. of credits<br><b>3</b>  |
| Status of the course in the study program (Basic, major, other)<br><b>(brak)</b>   |   | (university-wide, from another field)<br><b>(brak)</b>  |
| Education areas and fields of science and art<br><b>social sciences</b>  |   | ECTS distribution (number and %)<br><b>3 100%</b>   |
| <b>Responsible for subject / lecturer:</b><br><br>dr Tomasz Brzęczek<br>email: tomasz.brzeczek@put.poznan.pl<br>tel. 61 665 33 92<br>Wydział Inżynierii Zarządzania<br>ul. Strzelecka 11 60-965 Poznań   |   |   |
| <b>Prerequisites in terms of knowledge, skills and social competencies:</b>  |   |   |
| 1  | <b>Knowledge</b>  | Student knows economic terms and management problems, especially operation management problems. |
| 2  | <b>Skills</b>   | Student has Excel and computer skills. Makes basic operations of matrix algebra.                |
| 3  | <b>Social competencies</b>                                      | Student works in team.  |
| <b>Assumptions and objectives of the course:</b><br>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.   |   |   |
| <b>Study outcomes and reference to the educational results for a field of study</b>  |   |   |
| <b>Knowledge:</b>  |   |   |
| 1. Student knows typical optimization problems in management, their objectives and constraints. - [K2A_W01]<br>2. Knows problems of production structure, mixture and scheduling. - [K2A_W09]<br>3. Knows transport plan problem. - [K2A_W09]<br>4. Knows optimization methods with continuous and discrete variable. - [K2A_W09]<br>5. Knows multi criteria optimization methods. - [K2A_W09]<br>6. Knows ordinary least squares method. - [K2A_W10]  |   |   |
| <b>Skills:</b>   |   |   |
| 1. Student builds input-output model of economic system effectiveness. - [K2A_U01]<br>2. Uses optimization methods: graphical, simplex, graphs and transportation algorithm. - [K2A_U04,]<br>3. Student estimates or optimizes models with Excel's Solver. - [K2A_U07]<br>4. Uses multi criteria methods (aims hierarchy, metacriterion, fulfillment degree, AHP). - [K2A_U04]<br>5. Estimates linear and linearizable econometric models with OLS. - [K2A_U04]<br>6. Explains results of optimization and econometric models and uses them in management. - [K2A_U02] |   |   |
| <b>Social competencies:</b>  |   |   |
| 1. Student is aware of optimization benefits in management and planning. - [K2A_K03]<br>2. Spreads optimization in management problem solving. - [K2A_K05]<br>3. Can objectively assess and analyze data and solutions of management problems. - [S2A_K06]   |   |   |

| <b>Assessment methods of study outcomes</b>  |                      |      |
|--|----------------------|------|
| Partial mark from activity at classes and from solving of tasks.   |                      |      |
| Pass mark from lecture and from exercises based on partial marks and results of written test of tasks solving.   |                      |      |
| <b>Course description</b>  |                      |      |
| 1. Estimation of linear and linearizable econometric models with OLS.<br>2. Clasification and modeling of decision tasks. Problems of production structure, mixture, resource division, transportation.<br>3. Linear programming. Simplex and graphical method.<br>4. Multi-criteria continous programming. Metacriterion, objectives hierarchy.<br>5. Multi-criteria integer programming. Fulfillment degre, AHP.<br>6. Net programming. CPM ? critical path method. PERT-program evaluation and review technique.<br>7. Transportat optimization problem and Little algorithm.<br>8. Decisions under risk. Decision tree and a newsboy problem.<br>DYDACTIC METHODS: lecture with problem analysis, exercises, case study. |                      |      |
| <b>Basic bibliography:</b>   |                      |      |
| 1. Badania operacyjne, Sikora W. (red.), PWE, Warszawa 2008.<br>2. Brzęczek T., Gaspars-Wieloch H., Godziszewski B., Podstawy badań operacyjnych i ekonometrii, Wydawnictwo PP, Poznań 2010.<br>3. Józefowska J., Badania operacyjne i teoria optymalizacji, Wydawnictwo PP, Poznań 2011.<br>4. Kufel T., Ekonometria. Rozwiązywanie problemów z wykorzystaniem programu GRET, WN PWN, Warszawa 2011.<br>5. Przykłady i zadania z badań operacyjnych i ekonometrii, Sikora W. (red.), Wyd. UEP, seria MD 163, Poznań 2005.   |                      |      |
| <b>Additional bibliography:</b>  |                      |      |
| 1. Anholcer M., Gaspars H., Owczarkowski A., Ekonometria z Excelem Wyd. UEP, Poznań 2010.<br>2. Ekonometria i badania operacyjne. Zagadnienia podstawowe, Guzik B. (red.), Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań 2003<br>3. Trzaskalik T., Wprowadzenie do badań operacyjnych z komputerem - CD, PWE, Warszawa 2008.<br>4. Witkowska D., Podstawy ekonometrii i teorii prognozowania, Oficyna Ekonomiczna, Kraków 2006.  |                      |      |
| <b>Result of average student's workload</b>  |                      |      |
| Activity   | Time (working hours) |      |
| 1. Lectures  | 16                   |      |
| 2. Exercises   | 14                   |      |
| 3. Consulting  | 2                    |      |
| 4. Own studies preparing to classes and passes   | 30                   |      |
| <b>Student's workload</b>  |                      |      |
| Source of workload   | hours                | ECTS |
| Total workload   | 62                   | 3    |
| Contact hours  | 32                   | 2    |
| Practical activities   | 14                   | 1    |