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| The title of the course | **Operational research** |
| Faculty | [Faculty of Mechanical Engineering and Computer Science](http://eng.ath.bielsko.pl/index.php/faculties/gerg) |
| The level of studies | Undergraduate (BA) |
| Semester | Summer |
| The form of classes and number of hours | Lecture/Project |
| Classes conducted for Polish students. Erasmus students can join them | Yes |
| Language of instruction | English |
| The number of ECTS | 2 |
| Teacher | Dr hab. inż. Wojciech Płowucha, prof. UBB |
| The aims of the course  (maximum 500 characters) | Introduction, a scope pf operational research. The graduate of this course should be prepare to use modern mathematical and calculation methods in design, management and exploitation of manufacturing systems and services. The calculation methods used in operational research will be used, especially within the decision-making process, linear programming and its application (transportation problem, cutting problem). The following methods will be presented: sensitivity analysis of optimal solution, dynamic programming, multi-criteria optimization, simulation techniques etc. |
| The content of the course: main topics and key ideas | The scope of operational research, basic terminology.  Linear programming. The meaning of terms: decision variables, decision space, objective function, constraints (in equal and non-equal form), allowable set, optimal solution.  Examples of linear programming. Geometrical method. Simplex method. Post optimization analysis.  The application of spreadsheet in solving the linear programming.  The application of linear programming in transportation problem and cutting problem.  Net methods.  Multi criteria optimization. Decision space. Criteria space. Optimal solution in Pareto sense.  Simulation techniques. Random numbers generators. Designing of simulation experiment. |
| Didactics methods | Lecture supported by multimedia presentation |
| Course requirements | Attendance |
| Literature (basic and supplementary) | Kukuła K. (red.): Badania operacyjne w przykładach i zadaniach. Wyd. IV zmienione, PWN, Warszawa 2002.  T. Szapiro (red.): Decyzje menedżerskie z Excelem. PWE, Warszawa 2000.  T. Trzaskalik: Wprowadzenie do BO z komputerem. PWE, Warszawa 2003.  W. Sikora (red.): Badania operacyjne. PWE, Warszawa 2008.  Stadnicki J.: Teoria i praktyka rozwiązywania zadań optymalizacji. WNT, Warszawa 2010 |
| The effects of the education   * knowledge * skills * social competences | **Knowledge**  The graduate has a knowledge in the scope of operational research useful in preparation and solving of simple tasks in the area of management and production engineering.  **Skills**  The graduate can use the analytical, simulation and experimental methods to define and solve engineering methods.  **Social competences**  The graduate is able to explain the information from production engineering in a widely understood way. |