



Subject card

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|---|--|--|-------------------------------------|------------|---|---------|-----|
| Subject name and code | Multi-Objective Optimization Algorithms, PG_00063921 | | | | | | |
| Field of study | Informatics | | | | | | |
| Date of commencement of studies | February 2027 | Academic year of realisation of subject | | | 2026/2027 | | |
| Education level | second-cycle studies | Subject group | | | Optional subject group Specialty subject group Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | Mode of delivery | | | at the university | | |
| Year of study | 1 | Language of instruction | | | Polish | | |
| Semester of study | 1 | ECTS credits | | | 3.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Department of Computer Architecture -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Joanna Szlarczyńska | | | | | |
| | Teachers | dr hab. inż. Joanna Szlarczyńska | | | | | |
| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 0.0 | 0.0 | 30 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | | Self-study | SUM | |
| | Number of study hours | 30 | 6.0 | | 39.0 | 75 | |
| Subject objectives | Learning modern multi-objective optimization methods and the possibilities of using them to solve real-world problems | | | | | | |

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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [K7_W04] knows and understands, to an increased extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or other elements or programmable devices specific to the field of study, and organization of work of systems using computers or such devices | Knows and is able to use programming platforms that offer access to multi-objective optimization algorithms | [SW1] Assessment of factual knowledge |
| | [K7_W01] knows and understands, to an increased extent, mathematics to the extent necessary to formulate and solve complex issues related to the field of study | Is able to model a given optimization problem, knows the basics of how optimization algorithms work and is able to interpret the results of their operation | [SW1] Assessment of factual knowledge |
| | [K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it | Is able to implement a program in a high-level language that solves a given multi-objective optimization problem | [SU4] Assessment of ability to use methods and tools |
| Subject contents | <p>Course content – lecture</p> <ol style="list-style-type: none"> 1. Introduction to optimization 2. Multi-Criteria Decision Making (MCDM) and Multi-Objective Optimization (MOO) 3. Multi-Objective Optimization model 4. Simplifying the Multi-Objective Optimization 5. AI meta-heuristics used in Multi-Objective Optimization 6. Selected meta-heuristic Multi-Objective Optimization algorithms 7. Programming frameworks and libraries for Multi-Objective Optimization 8. Methods of taking into account the decision-maker's preferences 9. Performance and efficiency testing of Multi-Objective Optimization algorithms | | |
| Prerequisites and co-requisites | Knowledge of issues related to operational research, ability to program in C++ and Python | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | laboratory exercises | 50.0% | 50.0% |
| | passing | 50.0% | 50.0% |
| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Multiobjective Optimization - Principles and Case Studies, Y. Collette, P. Siarry, Springer, 2003 2. Multi-Objective Optimization Problems Concepts and Self-Adaptive Parameters with Mathematical and Engineering Applications, F. S. Lobato, V. Steffen Jr., Springer, 2017 3. Lecture materials. | |
| | Supplementary literature | <ol style="list-style-type: none"> 1. Qi Liu, Xiaofeng Li, Haitao Liu, Zhaoxia Guo, Multi-objective metaheuristics for discrete optimization problems: A review of the state-of-the-art, Applied Soft Computing, Volume 93, 2020, 106382, ISSN 1568-4946, https://doi.org/10.1016/j.asoc.2020.106382. | |
| | eResources addresses | | |
| Example issues/ example questions/ tasks being completed | | | |
| Practical activities within the subject | Not applicable | | |

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