GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | Theory of optimisation, PG_00057243 | | |
| Field of study | Ocean Engineering | | |
| Date of commencement of studies | February 2023 | Academic year of realisation of subject | 2022/2023 |
| Education level | second-cycle studies | Subject group | Obligatory subject group in the field of study<br>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 | Faculty of Ocean Engineering and Ship Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Tacjana Niksa-Rynkiewicz | |
| | Teachers | dr inż. Tacjana Niksa-Rynkiewicz | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 15.0 | 15.0 | 0.0 | 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 | 5.0 | 40.0 | 75 |

**Subject objectives**

The aim of the lecture is to extend knowledge about optimization methods using artificial intelligence methods. The aim of the exercises is to study the effectiveness of various optimization methods and to apply selected methods to solve practical engineering problems.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_W01] has a deepened and widened knowledge on certain fields of maths, used to formulate, solve and verify complex problems in ocean-technology | The student knows optimization methods based on methods used in artificial intelligence, evolutionary algorithms | [SW1] Assessment of factual knowledge |
| [K7_U02] can plan and conduct research experiments on selected problems in ocean technology using various research methods | He/She is able to use mathematical methods for the description of decision processes in selected problems in the field of ocean engineering | [SU2] Assessment of ability to analyse information |
| [K7_W02] has a widened knowledge in the range of modelling technological processes, including knowledge necessary to describe and assess the functioning of selected elements of ocean technology objects and systems | The student knows the classification of problems and optimization methods using AI and the possibilities of solving them | [SW1] Assessment of factual knowledge |

**Subject contents**

1. Introduction2. Optimization and AI methods3. Genetic algorithms4. Evolutionary algorithms5. Application of evolutionary algorithms in the optimization process

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| Prerequisites and co-requisites | Knowledge at the level of first degree.major Ocean Engineering:Mathematics IMathematics IIApplication of numerical methods |

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| colloquy | 56.0% | 100.0% |

**Recommended reading**

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| Basic literature | 1. Amborski, K., Podstawy metod optymalizacji, Oficyna Wydawnicza Politechniki Warszawskiej, 2009.<br><br>2. Stachurski, A. Wprowadzenie do optymalizacji, Oficyna Wydawnicza Politechniki Warszawskiej, 2009. |
| Supplementary literature | 1. 1.D"Azzo J.J., Houpis C.H., Linear control system analysis and design- conventional and modem, MCGraw Hill Co.,1988<br>2. D'Souza A.F., Design of control systems, Prentice Hull, 1988<br>3. 2 Kukuła K., Badania operacyjne w przykładach i zadaniach, PWN, Warszawa 2011<br>4. Milkiewicz F., Podstawy optymalizacji, Wydawnictwo PG, 1995<br>5. Stengel R. F., Optimal control and estimation, Dover Publications Inc., New York, 1994. |
| eResources addresses | Adresy na platformie eNauczanie:<br>Teoria optymalizacji OCE II sem 1 lato 2022/2023 - Moodle ID: 30149 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30149 |

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| Example issues/ example questions/ tasks being completed | 1. Please provide the assumptions of the genetic algorithm2. Please analyze the crossing methods |
| Work placement | Not applicable |