# GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

| Subject name and code | Control and Decision Support Systems, PG_00038282 | | | | | | |
|---|---|---|---|---|---|---|---|
| Field of study | Automation, Robotics and Control Systems | | | | | | |
| Date of commencement of studies | October 2024 | | Academic year of realisation of subject | | 2024/2025 | | |
| Education level | second-cycle studies | | Subject group | | Obligatory subject group in the field of study | | |
| | | | | | Subject group related to scientific research in the field of study | | |
| Mode of study | Part-time studies | | Mode of delivery | | at the university | | |
| Year of study | 1 | | Language of instruction | | Polish | | |
| Semester of study | 2 | | ECTS credits | | 2.0 | | |
| Learning profile | general academic profile | | Assessment form | | assessment | | |
| Conducting unit | Department of Control Systems Engineering -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr inż. Jarosław Tarnawski | | | | |
| | Teachers | | | | | | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 10.0 | 0.0 | 10.0 | 0.0 | 0.0 | 20 |
| | E-learning hours included: 0.0 | | | | | | |
| | Adresy na platformie eNauczanie: | | | | | | |

| 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 | 20 | 4.0 | 26.0 | 50 |

| Subject objectives | The aim of the course is to learn the selected advanced control systems and decision support systems. |
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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|---|---|---|---|
| | [K7_U11] is able to design and realise simple electrical circuits and control systems for a facility or industrial process using computer systems | The student should understand the purpose of replacing the basic methods and automation tools with the more advanced ones. The student should be able to choose an advanced control method for various applications. The student should be able to synthesize a multiregional PID, adaptive and predictive controller. The student should understand the location of the decision support system in automation applications. The student should be able to build a decision support system and be able to integrate it with the automation system. | [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment |
| | [K7_W02] has a structured knowledge of the application of information systems to improve the reliability, efficiency, speed and mobility of control and management systems | The student should be able to use computer methods and systems of rapid prototyping to design, simulate and analyze the use of advanced control and decision support methods. | [SW1] Assessment of factual knowledge |

| Subject contents | Control methods: |
|---|---|
| | Multi-area PID controllers hard and soft switched using fuzzy logic |
| | Adaptive control, direct and indirect |
| | Predictive control |
| | The methods reasoning and decision support: |
| | AHP - Analytic Hierarchy Process |
| | PCA - Principal component analysis |

| Prerequisites and co-requisites | Finished courses: |
|---|---|
| | Structures and algorithms of control systems |
| | Structures and algorithms for decision support systems |

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Lectures part | 50.0% | 60.0% |
| Lab part | 50.0% | 40.0% |

**Recommended reading**

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| Basic literature | Niederliński A., Mościński J., Ogonowski Z., Regulacja adaptacyjna, PWN, Warszawa 1995. |
| | Tatjewski P., Sterowanie zaawansowane obiektów przemysłowych, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2002. |
| | Maciejowski J.M., Predictive Control with Constaints, Prentice Hall, 2002. |
| | Camacho, Bordons, Model predictive control. Springer Verlag. 2004 |
| | Korbicz, Kościelny, Kowalczuk, Cholewa, Diagnostyka procesów, WNT 2002 |
| | Grega, Metody i algorytmy sterowania cyfrowego w układach scentralizowanych i rozproszonych, AGH, 2004 |
| Supplementary literature | Camacho, Bordons, Model predictive control. Springer Verlag. 2004 |
| | Grega, Metody i algorytmy sterowania cyfrowego w układach scentralizowanych i rozproszonych, AGH, 2004 |
| eResources addresses | |

| Example issues/ example questions/ tasks being completed | Construction is multi controller |
|---|---|
| | Construction of predictive control system |
| | Construction of adaptive control system |
| | Decision-making using AHP method |
| | Diagnosis of an industrial process using PCA method |

| Work placement | Not applicable |
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