# GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

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| Subject name and code | Drive Automatics and Servomechanisms, PG_00038107 |
| Field of study | Automation, Robotics and Control Systems |

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| Date of commencement of studies | October 2023 | Academic year of realisation of subject | 2025/2026 |
| Education level | first-cycle studies | Subject group | |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 3 | Language of instruction | Polish |
| Semester of study | 5 | ECTS credits | 5.0 |
| Learning profile | general academic profile | Assessment form | exam |

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| Conducting unit | Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering |

| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Elżbieta Bogalecka |
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| | Teachers | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 30.0 | 0.0 | 30.0 | 0.0 | 0.0 | 60 |
| | 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 | 60 | 8.0 | 57.0 | 125 |

| Subject objectives | The aims of the course are: to show the principles and applications of industrial controlled electrical drives, including the principles of operation of electrical machines, introduction to the physics of motion control and energy conversion., to learn methods of controlling servodrives. |
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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
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| | [K6_K05] can think and act in an entrepreneurial way | the student is able to plan the method and sequence of activities to perform a laboratory task. The student is able to deal with real technical problems. | [SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice |
| | [K6_U05] can use analytical and simulation methods to solve tasks in the field of automation and robotics and use various techniques to carry out engineering tasks related to automation and robotics devices and systems | the student, using the knowledge acquired in the course, is able to properly perform the task using simulation tools and technical devices. the student is able to process and analyze measurement results and present them in the form of a report. | [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information |
| | [K6_W08] knows the basics of equipment selection and control of electrical machines and servos | the student is able to determine the requirements for the drive system for a given application. The student knows how to choose the right control method | [SW1] Assessment of factual knowledge |

| Subject contents | Machine as an actuator in the control system, the rules of position, speed and torque control of electrical machines, equations of motion. Types of electrical machines, load characteristics, operating point of the drive, mechanical characteristics . Types of electrical machines and their properties. The structure of control system. Selection of control variables and parameters,  measurement of electrical and mechanical variables. Energy Recovery during braking . Influence of limitations to the quality of control. Terms of scalar and vector control of AC machine. Servomechanism: control structures, distortions, effect of friction, gravity, moment of inertia and the load on quality control. Analysis of selected industrial applications: lift, winch, winder, the drive traction, a robot arm. |
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| Prerequisites and co-requisites | Knowledge of the basics of power electronics, electrical engineering, including transients in electrical circuits, mechanics and control theory |
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| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
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| | Laboratory reports | 60.0% | 50.0% |
| | Exam | 50.0% | 50.0% |

| Recommended reading | Basic literature | 1. Laboratory instructions and lectures reported in www.ely.pg.gda.pl/ KANE<br>2. Zawirski K, Deskur J.: Automatyka napędu elektrycznego, 2012.<br>3. Serwomechanizmy Siemens w praktyce inzynierskiej, wyd. BTC, 2020 |
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| | Supplementary literature | 1. Krzemiński Z.: Cyfrowe sterowanie maszynami asynchronicznymi, Gdańsk, Wydawnictwo PG, 2003.<br>2. Orłowska-Kowalska T.: Bezczujnikowe układy napędowe z maszynami asynchronicznymi, Oficyna Wydawnicza politechniki Wrocławskiej, 2005.<br>3. Zawirski K.: Układy napędowe z maszynami synchronicznymi, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005. |
| | eResources addresses | Podstawowe<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=16839 - lecture materials and laboratory instructions<br>Adresy na platformie eNauczanie: |
| Example issues/ example questions/ tasks being completed | 1. Equation of motion<br><br>2. Mathematical model of DC machine<br><br>3. The rules of the controller parameters setting<br><br>4. Servodrive control system structure<br><br>5. V/f control of induction machine | |
| Work placement | Not applicable | |