



Subject card

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|---|--|---|--|------------|---------|---------|-----|
| Subject name and code | Drive Automatics and Servomechanisms, PG_00038107 | | | | | | |
| Field of study | AUTOMATYKA NAPĘDU I SERWOMECHANIZMY | | | | | | |
| 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 | | | | |
| Conducting unit | Department of Electric Drives and Energy Conversion -> Faculty of Electrical and Control Engineering -> Wydział Politechniki Gdańskiej | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Arkadiusz Lewicki | | | | | |
| | Teachers | mgr inż. Krzysztof Łuksza prof. dr hab. inż. Marcin Morawiec dr hab. inż. Arkadiusz Lewicki | | | | | |
| Lesson types | 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 | | | | | | |
| | eNauczanie source addresses: Moodle ID: 814 AUTOMATYKA NAPĘDU I SERWOMECHANIZMY [ARiSS][2025/26] https://enauczanie.pg.edu.pl/2025/course/view.php?id=814 | | | | | | |
| 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 aim of the course is to enable students to master the principles of operation and industrial applications of automated drive systems with electric machines, including the principles of operation of these machines, to familiarize themselves with the physics of motion control and energy processes, and to learn methods of servomechanism control. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | Method of verification | | | | |
| | [K6_W08] knows the basics of equipment selection and control of electrical machines and servos | Defines the requirements for the drive system for a given application. Selects the appropriate control method. | [SW1] Ocena wiedzy faktograficznej | | | | |
| | [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 | Uses technical equipment. Processes and analyzes measurement results and presents them in the form of a report. | [SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania [SU1] Ocena realizacji zadania [SU2] Ocena umiejętności analizy informacji | | | | |
| | [K6_K05] can think and act in an entrepreneurial way | Plans the method and sequence of activities to complete a laboratory task. Copes with real technical problems. | [SK1] Ocena umiejętności pracy w grupie [SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce | | | | |

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| Subject contents | Course content – lecture 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. | | |
| | Course content – laboratory DC motor drive; Scalar control of induction motor Vector control of induction motor Voltage source inverter configuration Servomechanism with variable load DC motor control system design Stepper motor control Numerical machine tool - G-code language | | |
| Prerequisites and co-requisites | Knowledge of the basics of power electronics, electrical engineering, including transients in electrical circuits, mechanics and control theory | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Laboratory reports | 60.0% | 50.0% |
| | Exam | 60.0% | 50.0% |
| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Laboratory instructions and lectures reported in www.ely.pg.gda.pl/ KANE 2. Zawirski K, Deskur J.: Automatyka napędu elektrycznego, 2012. 3. Serwomechanizmy Siemens w praktyce inżynierskiej, wyd. BTC, 2020 | |
| | Supplementary literature | <ol style="list-style-type: none"> 1. Krzemiński Z.: Cyfrowe sterowanie maszynami asynchronicznymi, Gdańsk, Wydawnictwo PG, 2003. 2. Orłowska-Kowalska T.: Bezczujnikowe układy napędowe z maszynami asynchronicznymi, Oficyna Wydawnicza politechniki Wrocławskiej, 2005. 3. Zawirski K.: Układy napędowe z maszynami synchronicznymi, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005. | |
| | eResources addresses | Basic https://enauczanie.pg.edu.pl/moodle/course/view.php?id=16839 - lecture materials and laboratory instructions | |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none"> 1. Equation of motion 2. Mathematical model of DC machine 3. The rules of the controller parameters setting 4. Servodrive control system structure 5. V/f control of induction machine | | |
| Practical activities within the subject | Not applicable | | |

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