



Subject card

| | | | | | | | |
|---|--|--|--|-------------------------------------|--|------------|-----|
| Subject name and code | Industrial Electronics, PG_00038349 | | | | | | |
| Field of study | Electrical Engineering | | | | | | |
| Date of commencement of studies | October 2022 | | Academic year of realisation of subject | | 2022/2023 | | |
| 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 | 1 | | ECTS credits | | 2.0 | | |
| Learning profile | general academic profile | | Assessment form | | assessment | | |
| Conducting unit | Department of Electrical Engineering of Transport -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Leszek Jarzębowicz | | | | |
| | Teachers | | dr hab. inż. Jarosław Łuszcz dr hab. inż. Leszek Jarzębowicz | | | | |
| 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 | | | | | | |
| 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 | | 2.0 | | 28.0 | 50 |
| Subject objectives | Understanding the different technical conditions for applications of electronic devices in industrial environments. The acquisition of design skills, software, and use of complex electronic devices and power electronics. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | K7_W06 | | Student describes the basic issues of industrial electronics. Chooses the controller of machinery and technological equipment and prepares their software. | | [SW3] Assessment of knowledge contained in written work and projects | | |
| | K7_U04 | | Chooses the electronic equipments e.g. programable motion controllers, sensors and other devices to control and data transmission for industry applications; completes their software. | | [SU1] Assessment of task fulfilment | | |
| Subject contents | LECTURE The rules of construction of industrial electronics equipment. Intelligent power modules IPM: integrated protection functions, sensors, drive circuits. Electronic devices and components: sensors, transducers, mixed signal processors, computer interfaces. Optoelectronics and power electronics devices. Industrial transducers with specialized interfaces for measurement: current, voltage, velocity and displacement. Industrial electronics application. Applications of microprocessors and microcontrollers. Industrial computers. Input-output interfaces. Motion control and positioning. Brushless dc and ac servo motors. Basics of computer numerical control. Control algorithms - torque control, speed and location, stiffness of the drive. Programmable motion control. Single and multiaxis motion control systems. Industrial e-automation. The selection of the propulsion system for a given application. Industrial interfaces transmission data. Serial interfaces. Wireless Sensor Network. LABORATORY Electronic transducers. Servodrive and their applications. Programming languages of motion. Data acquisition systems. Specialized interfaces microcontrollers. | | | | | | |
| Prerequisites and co-requisites | Basic knowledge of electrical engineering, electronics and control engineering. | | | | | | |

| | | | |
|--|---|---|-------------------------------|
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Report from laboratory exercises | 60.0% | 30.0% |
| | Midterm colloquium | 60.0% | 70.0% |
| Recommended reading | Basic literature | Mohan N., Undeland T.M., Robbins W.P.: Power Electronics. John Wiley & Sons, Inc. N.Y. Chichester Brisbane Toronto Singapore 1995. Szczęsny R.: Komputerowa symulacja układów energoelektronicznych. Gdańsk: Wyd. Politechniki Gdańskiej 1999. Younkin G. W.: Industrial Servo Control Systems. Fundamentals and Application. Marcel Dekker 2003. | |
| | Supplementary literature | Wilamowski B. M., Irwin J. D.: The Industrial Electronics Handbook. Power electronics and motor drives. CRC Press, Taylor and Francis Group, LCC, 2011 | |
| | eResources addresses | Adresy na platformie eNauczanie: | |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none">1. Draw recommended and not recommended for the control optocoupler power electronic devices and explain the impact of electromagnetic disturbances on these systems.2. Define the servo drive and draw a simplified block diagram. In the figure distinguish signals feedback. Explain the action of the individual blocks.3. Characterize wireless sensor networks (WSN). | | |
| Work placement | Not applicable | | |