



## Subject card

|   |  |  |                              |                                     |  |            |     |
|---|--|--|------------------------------|-------------------------------------|--|------------|-----|
| Subject name and code                       | Electronics, PG_00038074   |  |                              |                                     |  |            |     |
| 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                             | first-cycle studies  | Subject group  |                              |                                     |  |            |     |
| Mode of study                               | Full-time studies  | Mode of delivery   |                              |                                     | at the university  |            |     |
| Year of study                               | 1  | Language of instruction  |                              |                                     | Polish   |            |     |
| Semester of study                           | 2  | ECTS credits   |                              |                                     | 4.0  |            |     |
| Learning profile                            | general academic profile   | Assessment form  |                              |                                     | exam   |            |     |
| Conducting unit                             | Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering   |  |                              |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   |  | dr hab. inż. Marek Turzyński |                                     |  |            |     |
|   | 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   |                              | 5.0                                 |  | 35.0       | 100 |
| Subject objectives                          | Knowledge and analysis of fundamental electronic components and applications.  |  |                              |                                     |  |            |     |
| Learning outcomes                           | Course outcome   | Subject outcome  |                              |                                     | Method of verification   |            |     |
|   | [K6_K05] can think and act in an entrepreneurial way   | The student is able to select the parameters of electronic components in order to optimize economic calculations.  |                              |                                     | [SK5] Assessment of ability to solve problems that arise in practice   |            |     |
|   | [K6_W05] has basic knowledge of the principles of operation of basic electronic, energy and power electronic components and systems  | The student is able to explain and knows the mechanisms of physical phenomena occurring in semiconductor materials.  |                              |                                     | [SW1] Assessment of factual knowledge<br>[SW3] Assessment of knowledge contained in written work and projects                |            |     |
|   | [K6_W04] has basic knowledge of methods of analysis of direct and alternating current circuits   | The student is able to analyze electronic circuits   |                              |                                     | [SW1] Assessment of factual knowledge<br>[SW3] Assessment of knowledge contained in written work and projects                |            |     |
|   | [K6_U08] can design and build systems and devices in the field related to mechatronics and robotics systems  | The student knows the principles of operation of elements and electronic systems. Is able to define the functions of an electronic system and can design an electronic system. |                              |                                     | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools |            |     |
| Subject contents                            | Laboratory equipment: multimeters, oscilloscopes, measuring probes. Passive electronic components: resistors, capacitors, inductors. Semiconductors: conduction processes, doped semiconductors, pn junction, ms junction. Diodes: switching, rectifier, Schottky, Zener, photodiodes, light emitting diodes, solar panels. Transistors bipolar and unipolar: structure, operation principles, electrical data and characteristics. Optoelectronic components. Amplifiers: technical data, characteristics, influence of negative feedback. Differential and operational amplifiers. Filters. Power amplifiers. Generators. Power supply units. Phase lock loop. Digital circuit technologies. A/C and D/C converters. |  |                              |                                     |  |            |     |
| Prerequisites and co-requisites             | Fundamentals of physics. Basic circuit theory.   |  |                              |                                     |  |            |     |
| Assessment methods and criteria             | Subject passing criteria   | Passing threshold  |                              |                                     | Percentage of the final grade  |            |     |
|   | Practical exercises  | 50.0%  |                              |                                     | 50.0%  |            |     |
|   | Written test   | 50.0%  |                              |                                     | 50.0%  |            |     |

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| Recommended reading  | Basic literature  | Opolski A.: Elektronika dla elektryków. Wydawnictwo PG, BibliotekaCyfrowa PG, 2008.<br>Opolski A. (red.): Elektronika dla elektryków - Laboratorium. Wydawnictwo PG. Gdańsk 2000.   |
|  | Supplementary literature  | Hennel J.: Podstawy elektroniki półprzewodnikowej. WNT Warszawa 2003.<br>Boksa J.: Analogowe układy elektroniczne. Wydawnictwo BTC Warszawa 2007.<br>Filipkowski A.: Układy elektroniczne analogowe i cyfrowe. WNT Warszawa 2006. |
|  | eResources addresses  | Adresy na platformie eNauczanie:  |
| Example issues/<br>example questions/<br>tasks being completed | Field-effect transistors: structure, classification, graphic symbols and current-voltage output characteristics |   |
| Work placement   | Not applicable  |   |