



Subject card

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|---|---|--|---|------------|--|---------|-----|
| Subject name and code | Industrial Computer Networks, PG_00038099 | | | | | | |
| Field of study | Electrical Engineering | | | | | | |
| Date of commencement of studies | October 2021 | Academic year of realisation of subject | | | 2023/2024 | | |
| Education level | first-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 | Full-time studies | Mode of delivery | | | at the university | | |
| Year of study | 3 | Language of instruction | | | Polish | | |
| Semester of study | 5 | ECTS credits | | | 2.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Mirosław Włas | | | | | |
| | Teachers | dr inż. Mirosław Włas | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 0.0 | 0.0 | 30 |
| | 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 | 30 | 2.0 | | 18.0 | | 50 |
| Subject objectives | The aim of the course is to provide a method of data exchange in industrial automation systems using serial interfaces, OPC, SCADA and dedicated software for programmable logic controllers. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | K6_W10 | | The student lists and characterizes the basic types of IT networks, explains how to connect network devices and voltage standards of the physical network layer. The student demonstrates how to configure network protocols in the configuration programs of programmable controllers and OPC servers. | | [SW3] Assessment of knowledge contained in written work and projects | | |
| | K6_K02 | | He/she is able to prepare together a report on a laboratory exercise. | | [SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness | | |
| | K6_U05 | | The student makes a proper selection of the IT network for the controlled and visualised process. He or she uses visualisation software with a SCADA class database system. | | [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools | | |

| Subject contents | <p>LECTURE General characteristics of Industrial Networks. Problems of electronic control and supervision in industrial environment. Classification of control and supervision systems - practical applications of electronic systems: PLC controllers, industrial computers, SCADA systems. Network systems of control and supervision. Distributed and centralized control. Real-time networks. Network models: Seven-layer ISO-OSI RM model, Four-layer model. Sample industrial networks - construction, characteristic elements, area of application. Local networks - Profibus, AS-I, CAN (Devicenet, CanOpen). Data exchange in the Ethernet network. Network configuration. Specialized software. Sample communication drivers: universal OPC client, Modbus RTU driver, Modbus TCP driver, GE Fanuc and Siemens controllers drivers.</p> <p>LABORATORY</p> <ol style="list-style-type: none"> 1. Practical application of a network standard serial communication R485. 2. Practical application of data exchange system using CAN network. 3. Global Pocket Radio Service in GSM system. 4. OPC with SCADA system. | | | | | | | | | | | |
|--|---|---|--|--------------------------|-------------------|-------------------------------|-------------------------|-------|-------|------------|-------|-------|
| Prerequisites and co-requisites | Basic skills connected with PLC and electronics. | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1" data-bbox="453 591 1484 696"> <thead> <tr> <th data-bbox="453 591 794 629">Subject passing criteria</th> <th data-bbox="794 591 1139 629">Passing threshold</th> <th data-bbox="1139 591 1484 629">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 629 794 663">Reports from laboratory</td> <td data-bbox="794 629 1139 663">50.0%</td> <td data-bbox="1139 629 1484 663">20.0%</td> </tr> <tr> <td data-bbox="453 663 794 696">Entry test</td> <td data-bbox="794 663 1139 696">50.0%</td> <td data-bbox="1139 663 1484 696">80.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Reports from laboratory | 50.0% | 20.0% | Entry test | 50.0% | 80.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | |
| Reports from laboratory | 50.0% | 20.0% | | | | | | | | | | |
| Entry test | 50.0% | 80.0% | | | | | | | | | | |
| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Mielczarek W.: Interfejsy szeregowo Helicon 1993. 2. Legierski T., Wyrwał J.: Programowanie sterowników PLC. WPK J. Skalmierskiego, Gliwice 1998. 3. Magrel L.: Uzdatnianie wody i oczyszczanie ścieków. Wyd. Ekonomia i Środowisko, Białystok, 1999. 4. Jakuszewski R.: Programowanie systemów SCADA. WPK J. Skalmierskiego, Gliwice 2002. 5. Bednarek M. : Wizualizacja procesów - laboratorium. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2001. | | | | | | | | | | |
| | Supplementary literature | <ol style="list-style-type: none"> 1. Kwiecień A.,: Analiza przepływu informacji w komputerowych sieciach przemysłowych.WPK J. Skalmierskiego, Gliwice 2000. 2. Solnik W., Znajda Z.: Komputerowe sieci przemysłowe Profibus DP i MPI. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2004. | | | | | | | | | | |
| | eResources addresses | Adresy na platformie eNauczanie: PRZEMYSŁOWE SIECI INFORMATYCZNE [ET][2023/24] - Moodle ID: 33642 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33642 | | | | | | | | | | |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none"> 1. Show transient of SDU variable 27 frame for 8 data bits 1 bit parity 1 stop bit. 2. Modbus RTU Parametry. 3. The structure of the GSM network to GPRS data transmission. 4. What is packet data? 5. The speeds and distances to work jaich CAN. 6. What is COM and DCOM? 7. Types of Profibus protocols. | | | | | | | | | | | |
| Work placement | Not applicable | | | | | | | | | | | |