

|   |  |  |                   |                                     |                        |         |     |
|---|--|--|-------------------|-------------------------------------|------------------------|---------|-----|
| Subject name and code                       | The programming of distributed measurement systems   |  |                   |                                     |                        |         |     |
| Field of study                              | Electrical Engineering   |  |                   |                                     |                        |         |     |
| Level of studies                            | undergraduate studies  | Type of subject  | elective          |                                     |                        |         |     |
| Mode of study                               | Full-time studies  | Mode of delivery   | at the university |                                     |                        |         |     |
| Year of study                               | 3  | Language of instruction                                  | English           |                                     |                        |         |     |
| Semester of study                           | 5  | ECTS credits   |                   |                                     |                        |         |     |
| Learning profile                            | general academic profile   | Assessment form  | assessment        |                                     |                        |         |     |
| Conducting unit                             | Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering |  |                   |                                     |                        |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   | dr inż. Beata Pałczyńska                                 |                   |                                     |                        |         |     |
|   | Teachers   |  |                   |                                     |                        |         |     |
| Lesson type and method of instruction       | Lesson type  | Lecture  | Tutorial          | Laboratory                          | Project                | Seminar | SUM |
|   | Number of study hours  | 15.0   | 0.0               | 15                                  | 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  | 15   |                   | 2.0                                 | 15.0                   | 32      |     |
| Subject objectives                          | The course gives students familiarity with programming of distributed measurement systems.       |  |                   |                                     |                        |         |     |
| Learning outcomes                           | Course outcome   | Subject outcome  |                   |                                     | Method of verification |         |     |
|   |  |  |                   |                                     |                        |         |     |
|   |  |  |                   |                                     |                        |         |     |

| Subject contents   | <p><b>Lectures.</b><br/> The organization of the distributed measurement system (DMS). Main techniques using the possibilities of the dispersion of the measurement system. The hardware architecture of the DMS.<br/> The special requirements of programming of the DMS. The design methodology of distributed measurement systems in the integrated programming environment LabVIEW.<br/> LabVIEW communication techniques for network distributed applications: communication methods, implementing communication tasks.<br/> The data transfer; non-deterministic (LabVIEW Shared Variable, Low Level Protocols (TCP/UDP), Data Socket); deterministic (NI Time-Triggered Variables, Reflective Memory).<br/> The remote application automation (VI Server).<br/> Communication tasks (data streaming, remote user interface, automating execution of remote system, Closed-loop control over Ethernet).<br/> The exemplary structure of the DMS. Configuration and debugging of the DMS.</p> |   |  |                          |                   |                               |            |       |       |  |  |  |
|--|--|---|--|--------------------------|-------------------|-------------------------------|------------|-------|-------|--|--|--|
| Prerequisites and co-requisites                          | Basic knowledge on electrical metrology.   |   |  |                          |                   |                               |            |       |       |  |  |  |
| Assessment methods and criteria                          | <table border="1" data-bbox="440 501 1474 613"> <thead> <tr> <th data-bbox="440 501 791 539">Subject passing criteria</th> <th data-bbox="791 501 1136 539">Passing threshold</th> <th data-bbox="1136 501 1474 539">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="440 539 791 577">Final test</td> <td data-bbox="791 539 1136 577">60.0%</td> <td data-bbox="1136 539 1474 577">50.0%</td> </tr> <tr> <td data-bbox="440 577 791 613"></td> <td data-bbox="791 577 1136 613"></td> <td data-bbox="1136 577 1474 613"></td> </tr> </tbody> </table>   |   |  | Subject passing criteria | Passing threshold | Percentage of the final grade | Final test | 60.0% | 50.0% |  |  |  |
| Subject passing criteria                                 | Passing threshold  | Percentage of the final grade   |  |                          |                   |                               |            |       |       |  |  |  |
| Final test   | 60.0%  | 50.0%   |  |                          |                   |                               |            |       |       |  |  |  |
|  |  |   |  |                          |                   |                               |            |       |       |  |  |  |
| Recommended reading                                      | Basic literature   | <ol style="list-style-type: none"> <li>1. Winiecki W.: Organizacja komputerowych systemów pomiarowych, Oficyna Wydawnicza PW, Wyd. 1, Warszawa 1997.</li> <li>2. Świsulski D.: Komputerowa technika pomiarowa, Agenda Wydawnicza PAK, Warszawa 2005.</li> <li>3. Lesiak P., Świsulski D.: Komputerowa technika pomiarowa w przykładach, Agenda Wydawnicza PAK, Warszawa, 2002.</li> </ol> |  |                          |                   |                               |            |       |       |  |  |  |
|  | Supplementary literature   | <ol style="list-style-type: none"> <li>1. Wells L.: LabVIEW Student Edition User`s Guide, Prentice Hall. 2010</li> </ol>  |  |                          |                   |                               |            |       |       |  |  |  |
|  | eResources addresses;  | <a href="http://www.ni.com">http://www.ni.com</a>   |  |                          |                   |                               |            |       |       |  |  |  |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none"> <li>1. Characterize a DMS concept.</li> <li>2. Describe an exemplary structure of the DMS.</li> <li>3. List communication methods using in the DMS.</li> <li>4. Describe features of LabVIEW Shared Variable</li> <li>5. Describe features of Network Data Streaming</li> </ol>   |   |  |                          |                   |                               |            |       |       |  |  |  |
| Work placement   | Not applicable   |   |  |                          |                   |                               |            |       |       |  |  |  |