

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Design of measurement systems in electric power engineering</b>		Code <b>1010315341010316093</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 4</b>
Elective path/specialty <b>High Voltage Engineering</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: - Classes: - Laboratory: - Project/seminars: <b>18</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art		ECTS distribution (number and %)
<b>Responsible for subject / lecturer:</b> dr inż. Krzysztof Walczak email: krzysztof.walczak@put.poznan.pl tel. 61 665 2797 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		<b>Responsible for subject / lecturer:</b> dr inż. Wojciech Sikorski email: wojciech.sikorski@put.poznan.pl tel. 61 665 2035 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Student has basic knowledge of electrical engineering, power engineering and digital metrology of basic physical quantities.
2	<b>Skills</b>	Student can use a personal computer in solving engineering tasks. Student is able to present the results of their work. Student is able to work in a team.
3	<b>Social competencies</b>	Student understands the importance of teamwork.
<b>Assumptions and objectives of the course:</b> Understanding the LabVIEW graphical programming environment. Creating applications that support the device and measuring card. Getting to know the basics of creating measurement systems and expert in electrical power systems.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Student can design and make the application in LabView environment that allows for the registration and processing of the signals recorded by the measuring systems for monitoring of typical power equipment. - [K_W05++, K_W15+++] 2. Student can design and make simple diagnostic applications in LabView environment for monitoring and analysis of devices operating in the electrical power grid. - [K_W05++, K_W16++]		
<b>Skills:</b> 1. Student can design computer applications designed to monitor the work of electrical equipment. - [K_U13+++] 2. Student can propose measurement-diagnostic solutions to increase the reliability of work of electrical equipment. - [K_U18++]		
<b>Social competencies:</b> 1. Student can think and act in a creative way to improve reliability of power device work. - [K_K01+++]		
<b>Assessment methods of study outcomes</b>		
Project exercise: - continuous evaluation, on each course - rewarding skills gain in the range of use of the principles and methods have met during the course, - assessment of knowledge and skills related to the implementation of the project, the assessment of project work effects and its presentation.		

<b>Course description</b>		
<p>Classes include the following topics: introduction to programming in LabVIEW graphical environment, way to prepare an application in a graphical programming environment, operations on arrays, strings, files, the use of structures, graphs, local and global variables, signal processing methods, support for signal acquisition cards and measurement equipment connected by standard interfaces or network, use the advanced features of signal acquisition and processing, the basics of creating complex measurement and expert systems.</p> <p>Update 2017:            Development of measurement systems with the use of NI MyRIO controller.</p>		
<p><b>Basic bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Tłaczała W.: Środowisko LabVIEW w eksperymencie wspomaganym komputerowo, Wydawnictwo PWN, 2017</li> <li>2. Maj P., Wirtualne systemy kontrolno-pomiarowe, Wydawnictwa AGH, 2011.</li> <li>3. Świsulski D.: Komputerowa technika pomiarowa Oprogramowanie wirtualnych przyrządów pomiarowych w LabView, Wydawnictwo PAK, Warszawa, 2005.</li> <li>4. Chruściel M.: LabVIEW w praktyce, Wydawnictwo BTC, 2008.</li> <li>5. Wirth N., Algorytmy + struktury danych = programy, WNT, 2004</li> </ol>		
<p><b>Additional bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Doering E., NI MyRIO Project Essentials Guide, National Instruments 2013</li> <li>2. Tumański S., Technika pomiarowa, WNT, 2013</li> <li>3. Sikorski W., Walczak K., Analiza trendu parametrów wyładowań niezupełnych realizowana przez system monitoringu transformatorów energetycznych PDtracker, Przegląd Elektrotechniczny, R. 90 Nr 10, 2014</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in project activities	18	
2. Consultation	5	
3. Preparing for classes	10	
4. Implementation of the project	15	
5. Preparation of project results presentation	4	
6. Presentation of the project results and credit the course	1	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	53	2
Contact hours	24	1
Practical activities	52	2