

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Virtual measuring devices		Code 1010324391010325953
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 5 / 9
Elective path/specialty Measurement Systems in Industry and	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 9 Classes: - Laboratory: - Project/seminars: 18		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: dr inż. Zbigniew Krawiecki email: zbigniew.krawiecki@put.poznan.pl tel. 616652546 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in the scope of electrotechnics, electronics, computer science, and metrology
2	Skills	Ability of the efficient self-education in the area of the chosen field and speciality of study
3	Social competencies	Awareness of the competencies broadening and ability to show the readiness to cooperate as a team
Assumptions and objectives of the course: - Knowledge of the modern techniques of acquisition, processing and presentation of measuring data. - Selected examples of the realization of virtual measuring devices.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Ability to characterize the importance and application possibilities of the modern measuring systems - [K_W05 ++, K_W18 +]		
2. Ability to explain the principles and techniques of measuring signal acquisition for industrial applications - [K_W07 +]		
Skills:		
1. Ability to work independently and as a team in the design and construction companies, research laboratories, industrial centres, and medical facilities - [K_U05 +]		
2. Ability to design the measuring systems creatively, using possibilities offered by new technologies - [K_U22 +]		
Social competencies:		
1. Ability to think and act enterprisingly in the area of the measuring systems to be used in industry - [K_K01 +, K_K04 +]		
Assessment methods of study outcomes		

<p>Lectures:</p> <ul style="list-style-type: none"> - evaluation of the knowledge with tests related to the content of lectures (test, computational and problem questions), awarding marks in laboratory exercises) - continuous estimation in all classes (awarding attendance in lectures, activity and quality of perception). <p>Projects:</p> <ul style="list-style-type: none"> - continuous estimating with the tests, - awarding the skill increase, - evaluation of the knowledge and skills concerning the realization of an individual project, evaluation of the made project. 		
Course description		
<ul style="list-style-type: none"> - General characteristics of the selected environments to program and control the measuring equipment. - Metrological properties of the DAQ cards. - Functional structure of a virtual measuring device. - Realization of a device with the multi-functional DAQ card. - Principles of preparation of an user interface and program code by the use of LabVIEW environment. - The program realization of some selected functions of measuring devices. 		
Basic bibliography:		
<ol style="list-style-type: none"> 1. D. Świsulski, Komputerowa technika pomiarowa, oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW, Agenda Wydawnicza PAK, Warszawa 2005. 2. M. Chruściel, LabVIEW w praktyce, Wydawnictwo BTC, Warszawa 2008. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. R. Rak, Wirtualny przyrząd pomiarowy. Realne narzędzie współczesnej metrologii, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	9	
2. Participation in projects classes	18	
3. Participation in consulting with the lecturer	3	
4. Realization of projects	25	
5. Preparation to the credit	26	
Student's workload		
Source of workload	hours	ECTS
Total workload	81	3
Contact hours	30	1
Practical activities	43	2