COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of virtual measuring devices

Course

Field of study
Mathematics in technology

Year/Semester
3/6

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	15	0
Tutorials	**Projects/seminars**	
0	0	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Basic knowledge in the scope of mathematics, electrotechnics, computer science. Ability of the efficient self-education in the area concerned with a chosen field of studies. Awareness of the necessity of competence broadening and ability to show a readiness to work as a team.

Course objective

Knowledge of the modern techniques of acquisition, processing and presentation of measuring data. Selected examples of the realization of virtual measuring devices. Fundamentals of programming for application of mathematical methods of processing and analysis of electrical signals.

Course-related learning outcomes

Knowledge

Ability to characterize the importance and application possibilities of the modern measuring systems.

Ability to explain the principles and techniques of measuring signal acquisition for industrial applications.

Skills

Ability to work independently and as a team in the design and construction companies, research laboratories, industrial centers, and medical facilities. Ability to design the measuring systems creatively, using possibilities offered by new technologies.

Social competences

Ability to think and act enterprisingly in the area of the measuring systems to be used in industry.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: evaluation of the knowledge related to the content of lectures (open, closed and problem questions, 50% pass mark). Bonus activity and quality of perception during the lecture.

Laboratories: evaluation of knowledge and skills related to the implementation of measurement task and evaluation of the report made in class or at home. Evaluation of degree of completed tasks and rewarding of activity.

Programme content

Lectures: general characteristics of the selected environments to program and control the measuring equipment. Software implementation of measuring instruments, use of mathematical functions. Simulation software to generate signals using mathematical formulas. Metrological properties of the DAQ (Data AcQuisition) 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. Acquisition and processing of data using the DAQ card. The use of advanced mathematical algorithms for the analysis of measurement results.

Laboratories: planning and implementation of tasks related to the construction of a virtual instrument, application of the *Mathematics* library, basic principles of creating a front panel and graphic code virtual instrument, learning how to measure signals with a DAQ card, application of the measurement task configuration assistant, stages of creating applications for DAQ measurements, acquisition analog signal, signal processing, visualization of measurement data.

Teaching methods

Lecture with multimedia presentation supplemented by examples on the board, initiation of discussions in relation to the subject, presentation of a new topic preceded by a reminder of the previous lecture (main issues).

Laboratory: groups of students work as teams. Discussion on different methods and aspects of problem solutions. Detailed reviewing of particular tasks documentation.

Bibliography

Basic

1. Świsulski D., Komputerowa technika pomiarowa, oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW, Agenda Wydawnicza PAK, 2005

2. Chruściel M., LabVIEW w praktyce, Wydawnictwo BTC, 2008

3. Maj P., Wirtualne systemy kontrolno-pomiarowe, Wydawnictwo AGH, 2011

Additional

1. Rak R., Wirtualny przyrząd pomiarowy. Realne narzędzie współczesnej metrologii, Oficyna Wydawnicza Politechniki Warszawskiej, 2003

2. Tłaczała W., Środowisko LabViewTM w eksperymencie wspomaganym komputerowo, Wydawnictwo WNT, 2014

3. Bishop H. R., LabVIEW student edition, Wydawca Pearson, 2015

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes~~/tutorials~~, preparation for ~~tests~~/exam, ~~project/~~laboratory report preparation) [1]	35	1,0

[1] delete or add other activities as appropriate