COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer-aided measurements in industry [S1Eltech1>D-KWPwP]

Course

Field of study
Electrical Engineering

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in the scope of electrotechnics, electronics, computer science and metrology. 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 using virtual instruments.

Course-related learning outcomes

Knowledge:
1. Ability to characterize the importance and application possibilities of the modern measuring systems and their applications in selected industries.
2. Knowledge of engineering technologies used in the construction of virtual measuring stations with

open architecture.

Skills:
1. Ability to obtain information from the literature about remote control of devices, knows how to integrate obtained information and critically evaluate.
2. Ability to use engineering tools to implement design or research tasks typical of the field of electrical engineering.

Social competences:
1. Ability to think and act enterprisingly in the area of measuring engineering.
2. Understands the need to improve professional competence.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture exam grade (open, closed and problem questions, 50% pass mark). Bonus activity and quality of perception during the lecture.
Laboratory: evaluation of knowledge and evaluation of the implementation of measurement task, rewarding activity, assessment of the report made in class or at home. Continuous assessment, rewarding the increase of skills from building virtual instruments.

Programme content

Lecture: introduction to computer-aided measurements in industry, utilization of software and modular instrumentation. Virtual measurement devices, multi-channel signal measurement, processing, presentation, and archiving.
User interface preparation and program code development in the LabVIEW environment.
Laboratory: planning and execution of tasks related to computer-aided measurements in the industry, practical exercises involving acquiring electrical signals, configuration of input blocks for modular instruments, single and multi-channel measurement paths with analog-to-digital conversion, control of peripheral devices.

Course topics

Lecture: introduction to computer-aided measurement in industry, use of software, measurement modules and industrial computers. Discussion of the construction of the virtual instrument measuring path. Examples of virtual instrument input blocks for measuring selected physical and electrical parameters. Discussion of the metrological properties of DAQ cards. Multi-channel signal measurement, processing, presentation and archiving. Preparation of user interface and code in LabVIEW. Program implementation of selected functions of measuring instruments.
Laboratory: planning and implementation of tasks from computer-aided measurement in industry, work with technical documentation, implementation of exercises with preliminary blocks to obtain an electric signal, configuration of input blocks of a modular device on the example of a measuring card, configuration of a single and multi-channel measurement task with A/C conversion, analysis, presentation and archiving of measurement results, control of peripheral systems.

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 projects documentation.

Bibliography

Basic
1. Świsulski D., Komputerowa technika pomiarowa, oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW, Agenda Wydawnicza PAK, 2005
2. Maj P., Wirtualne systemy kontrolno-pomiarowe, Wydawnictwo AGH, 2011

3. Nawrocki W., Komputerowe systemy pomiarowe, WKŁ, 2007
4. Chruściel M., LabVIEW w praktyce, Wydawnictwo BTC, 2008
5. Winiecki W., Organizacja komputerowych systemów pomiarowych, Oficyna Wydawnicza Politechniki Warszawskiej, 2006
Additional
1. Nawrocki R., Rozproszone systemy pomiarowe, WKŁ, 2006
2. Rak R., Wirtualny przyrząd pomiarowy. Realne narzędzie współczesnej metrologii, Oficyna Wydawnicza Politechniki Warszawskiej, 2003
3. Tłaczała W., Środowisko LabViewTM w eksperymencie wspomaganym komputerowo, Wydawnictwo WNT, 2014

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	90	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00