COURSE DESCRIPTION CARD - SYLLABUS

Course name
Measurement Systems in Electric Power Engineering [S2Eltech2-IWN>SPwE]

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
High Voltage Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student has knowledge of mathematics and numerical methods. They have knowledge of the basics of programming. The student has knowledge of the construction and operation of measuring equipment and measuring techniques used in the power industry. The student is able to choose the measurement technique to determine the diagnostic parameters of electric power circuits and devices.

Course objective

Understanding the methods of designing the software layer of diagnostic systems used in the electrical power industry. Getting to know the methods of acquisition and digital processing of measurement signals recorded by transducers, controllers, and sensors used in the electrical power industry. Getting to know the interfaces and communication protocols used in automatic measurement systems.

Course-related learning outcomes

Knowledge:
1. The student has knowledge of the design and programming of diagnostic systems used to test electrical power devices.
2. The student has knowledge of digital processing of measurement signals.

Skills:
1. The student is able to select and integrate the elements of a specialized measurement and control system, including central unit, measuring sensors, controllers, peripherals and communication modules, and signal acquisition modules.
2. The student is able to design and create software for the control and measurement system for the needs of a given diagnostic method.
3. The student is able to implement and apply selected methods of digital processing of measurement signals.
4. The student is able to cooperate with the project team.

Social competences:
1. The student is ready to act as a responsible designer of measurement systems used in the electrical power industry.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Continuous assessment in class - rewarding activity.
2. Colloquium conducted at the end of the semester.

Programme content

The issues covered include the creation of measurement systems used in the power industry using the LabVIEW programming environment and virtual measurement devices (signal acquisition cards, controllers, sensors and measurement transducers).

Course topics

1. Tools for designing control and measurement systems: LabVIEW programming environment (National Instruments), graphical programming language G, virtual measuring instruments, data structures and control structures (loops, arrays, conditional structures, management of the order of execution of operations, event control, semaphores, subroutines), graphical user interface, visualization of measurement data.
2. Programming measuring cards and devices (measurement and generation of analog signals), configuring signal acquisition threads (acquisition of a finite series of samples, continuous acquisition, acquisition of a single sample).
3. Programming control and measurement applications using virtual sensors of power devices

Teaching methods

Laboratory: solving tasks, practical exercises, teamwork.

Bibliography

Basic:
1. Chruściel M., LabVIEW w praktyce, Wydawnictwo BTC, 2014.
2. Maj P., Wirtualne systemy kontrolno-pomiarowe, Wydawnictwa AGH, 2011.
3. Bień A., Systemy pomiarowe w elektroenergetyce, Wydawnictwa AGH, 2013.
4. Świsulski D., Komputerowa technika pomiarowa. Oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW, Agenda Wydawnicza PAK, 2005.
5. Świsulski D., Przykłady cyfrowego przetwarzania sygnałów w LabVIEW, Wydawnictwo Politechniki Gdańskiej, 2012.

Additional:
1. LabVIEW Getting Started with LabVIEW, National Instruments, 2013.
2. LabVIEW Fundamentals, National Instruments, 2005.
3. LabVIEW Data Acquisition Basics Manual, National Instruments, 2000.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00