COURSE DESCRIPTION CARD - SYLLABUS

Course name
Advanced sensory systems [S2Eltech1E-ISP>ZSS]

Course

Field of study
Electrical Engineering

Year/Semester
1/2

Area of study (specialization)
Smart Measurement Systems

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student should have knowledge of electrical metrology, electronics and microprocessor technology. He should know the basics of the C ++ language and connect simple measuring systems based on diagrams. He should work effectively in a group.

Course objective

Understanding the principles of operation, configuration and programming of intelligent sensors and AFE systems

Course-related learning outcomes

Knowledge:
1. Has extended knowledge in the field of measurements of electrical quantities and selected non-electrical quantities. Has knowledge of the development of the results of the experiment
2. Has extended knowledge in the field of analysis and synthesis of intelligent measurement sensors and AFE systems.

Skills:

1. Can obtain information from literature, catalog cards of electronic components and other sources, interpret them, evaluate them, critically analyze and synthesize them, and use them in work with selected programming languages and development tools.
2. Reads and understands professional literature in Polish and English. Can check and deliver a presentation on the implementation of project or research tasks.

Social competences:
1. Is aware of the need to develop professional achievements and observe the rules of professional ethics, fulfill social obligations, inspire and organize activities for the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Written test (passing threshold: above 50%) or control thesis in the form of a project
Laboratory classes: Initial assessment of knowledge needed to solve laboratory tasks. Continuous assessment in all laboratory classes and rewarding activity and skills improvement. Assessment of the final reports from laboratory classes.

Programme content

Basic information about measurement sensors. Construction and principle of operation of the intelligent sensor and the AFE (Analog Front to End) system.
Wired and wireless digital communication interfaces: I2C, SPI, 1-WIRE, RS232C, Bluetooth, WiFi. Software terminals for data transmission
Sharing measurement data on websites

Course topics

Update 20.06.2024
Lecture: The basic of principle of operating of measurement sensors. The conditioning of signal from sensor. Integrated conditioners of measuring signals with analog output. Wired and wireless standards of data transmission using in sensory systems. Using of intelligent sensors with digital inteface. The principles of operation and programming AFE (Analog Front to End) systems. Application of microcontrollers in sensory systems.
Laboratory classes: Issues of communication and programming of intelligent measuring sensors and AFE systems.

Teaching methods

Lecture: Multimedia presentations with examples shown on the board and demonstration experiments. Indicating the practical aspect of the issues discussed. Solving issues of a design nature. Assessment of student activity during classes.
Laboratory classes: Team work. Practical implementation of experiments supported by multimedia presentations. Discussion of reports by the teacher.

Bibliography

Basic:
1. Mielczarek W., Szeregowe interfejsy cyfrowe, Wyd. Helion, Gliwice 1993.
2. Nawrocki W., Sensory i systemy pomiarowe, Wyd. Politechnik Poznańskiej, Poznań 2006????.
3. Bogusz J., Lokalne interfejsy cyfrowe w systemach cyfrowych. Wyd. BTC, Warszawa 2004
4. Baranowski R., Mikrokontrolery AVR ATmega w praktyce. Wyd. BTC, Warszawa 2005
5. M. Miłek, Metrologia elektryczna wielkości nieelektrycznych, Wyd. UZ, Zielona góra, 2006.
6. A. Gajek, Z. Juda, Czujniki samochodowe, WKŁ, Warszawa 2011.
7. Kniat J. Programowanie obiektowe w języku C++. Wydawnictwo Politechniki Poznańskiej, Poznań 1995.
8. Sibigtroth J.M. Zrozumieć małe mikrokontrolery, Wydawnictwo BTC, Warszawa 2003.
9. Pełka R. Mikrokontrolery architektura, programowanie, zastosowania. WKiŁ, Warszawa 1999.

Additional:

1. Zieliński T., Cyfrowe przetwarzanie sygnałów. WKiŁ, Warszawa 2005.
2. P. Horowitz, W. Hill Sztuka elektroniki. Cz. 1 i 2, WKiŁ. Warszawa, 2013.
3. U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa, 2009.
4. Hajduk Z., Mikrokontrolery w systemach zdalnego sterowania. Wydawnictwo BTC. Warszawa 2005.
5. Hulewicz A., Cysewska-Sobusiak A., Bołtrukiewicz M., Wireless transmission of photoplethysmographic signals, Elektronika, nr 8-9/2004, s.142-145.
6. Hulewicz A., Bołtrukiewicz M., Prokop D., Cysewska-Sobusiak A., Mikroprocesorowe urządzenie do numeracji pakietów UDP, Pomiary Automatyka Kontrola, nr 9/2005, s. 34-36.
7. Bołtrukiewicz M., Generator cyfrowy do współpracy z czujnikami pomiarowymi, Elektronika, nr 6/2008, str. 180-181.

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