COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer support for experiment

Course

Field of study
Technical Physics

Year/Semester
3/5

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
compulsory

Number of hours

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

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
dr inż. Adam Buczek, prof. PP

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Responsible for the course/lecturer:

Prerequisites

1. Basic knowledge concerning electronics and informatics.

2. Ability to work with computer and acquire information from given sources.

3. Understanding of necessity of own competence broadening, responsibility for created technical soultions.

Course objective

1. Hand over knowledge concerning electronics and informatics solutions for experimental and measurement tasks.

2. Develop students abilities to create functional measurement systems based on modern hardware and software solutions.

3. Mold students responsibility for created engineering systems.

Course-related learning outcomes

Knowledge

W01. Knowledge about parameters of analog and digital signals and systems [K1_W08].

W02. Knowledge within parameters and applications of devices, laboratory apparatus, vision systems and actuators. Ability to connect them with computer systems. [K1_W08, K1_W15].

W03. Knowledge about methods of measurement of electrical and not electrical quantities and sources of measurement uncertainties in computer systems [K1_W09].

W04. Knowledge within methods of building of simple electronic devices useful in experiments supported by computer (e.g. amplifiers, differential and integrator circuits) [K1_W10].

Skills

U01. Using (with understanding) recommended engineering knowledge sources (basic bibliography), and current literature (e.g. books, proffesional magazines, documentations of producers e.t.c.) [K1_U02, K1_U03].

U02. Planning of choosing a components and modules of computer measurement systems (e.g. connectors, cables, sensors, measurement and interface computer cards) [K1_U20].

U03. Building computer software for control of measurements systems [K1_U16].

U04. Preparing technical documentation to illustrate way of working of measurement software [K1_U21].

Social competences

K01. Aware of threats for users of computer supported systems and necessity of using of security mechanisms and methods facilitating exploitation of made constructions [K1_K05].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Effect:	Evaluation form:	Evaluation criteria:
W01, W02, W03, W04	Oral / written exam	50.1%-70.0% (3) 70.1%-90.0% (4) from 90.1% (5)
U01, U02, U03, U04, K01	Evaluation of work and activity on laboratory classes:	

Student works strongly supported by teacher, with understanding of acquired knowledge. Is able to solve assigned tasks only in common way. Is not capable to analyze more problems than covered by basic scope of teaching. Demonstrate limited engagement during lessons. (3)

Student works independently, occasionally supported by teacher, with understanding of acquired knowledge. Is able to solve assigned tasks in proper way. Sometimes is capable to analyze more problems than covered by basic scope of teaching. Demonstrate engagement during lessons. (4)

Student works fully independently with deep understanding of acquired knowledge. Is able to solve assigned tasks in ingenious and unconventional way. Is capable to analyze more problems than covered by basic scope of teaching. Demonstrate great engagement during lessons. (5)

Programme content

1. Sources of knowledge in scope of computer support for experiment (e.g. books, proffesional magazines, documentations of producers e.t.c.),

2. Analog and digital signals, solutions for transfer both of them,

3. Analog to digital conversion:
- Parameters and configuration of A/C converters,
- Applications of A/C converters in experimental work,

4. Digital to analog conversion:
- Parameters and configuration of C/A converters,
- Applications of C/A converters in experimental work,

5. Digital circuits and interfaces:
- Types of digital circuits,
- Digital communication interfaces,
- Applications of digital circuits and interfaces in experimental work,

6. Digital systems designed for experimental support:
- Modular systems,
- Embedded systems,
- Systems with microcontroller,
- Real Time systems,

7. Laboratory apparatus controlled by computer (e.g. generators, multimeters, oscilloscopes),

8. Universal and dedicated computer cards:
- Analog - digital converters,
- Digital - analog converters,
- Digital interfaces,
- Laboratory apparatus cards,

9. Measurement sensors:
- Sensors of electrical quantities,
- Sensors of chosen not electrical quantities,
- Signal conditioning,

10. Vision systems,

11. Controlling of loads and actuators,

12. Programming of computer measurement systems:
- Standard Commands for Programmable Instruments (SCPI),
- Graphical programming language LabVIEW,

13. Ergonomic and safety in building and exploitation of experiments systems supported by computer.

Teaching methods

Lecture: multimedial presentation.

Laboratory classes: practical exercises in building software useful in experiments supported by computer.

Bibliography

Basic

1. K. Hejn, A. Leśniewski. Systemy pomiarowe. WPW, Warszawa 2017

2. W.Nawrocki. Komputerowe systemy pomiarowe. WKŁ, Warszawa 2007

3. W. Tłaczała. Środowisko LabVIEW w eksperymencie wspomaganym komputerowo. WNT, Warszawa 2020

4. M.Chruściel. LabVIEW w praktyce. BTC, Legionowo 2008

5. A.Jurkowski, M.Maćkowski, S.Michalak, J.Pająkowski, M.Wawrzyniak. Komputerowe systemy pomiarowe. Ćwiczenia laboratoryjne. WPP, Poznań 2007

Additional

1. R. Kwiecień. Komputerowe systemy automatyki przemysłowej. Helion, Gliwice 2013

2. S. Tumański. Technika pomiarowa. PWN, Warszawa 2019

3. W.Nawrocki. Sensory i systemy pomiarowe. WPP, Poznań 2006

4. W.Tłaczała, L.Tykarski. Elektronika w eksperymencie fizycznym. WPW, Warszawa 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,0
Classes requiring direct contact with the teacher	64	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) [1]	56	2,0

[1] delete or add other activities as appropriate