# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer support for experiment [S1ETI2>KWE]

## Course

Field of study
Education in Technology and Informatics

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

## Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

## Number of credit points

4,00

## Coordinators

## Lecturers

## 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:
Knowledge about methods of programming of measurement systems in graphical language LabVIEW
Knowledge about methods of measurement of electrical and not electrical quantities and sources of measurement uncertainties in computer systems
Knowledge within methods of building of simple electronic devices useful in experiments supported by computer (e.g. amplifiers, differential and integrator circuits)

Skills:

Using (with understanding) recommended engineering knowledge sources (basic bibliography), and current literature (e.g. books, proffesional magazines, documentations of producers e.t.c.)
Planning of choosing a components and modules of computer measurement systems (e.g. connectors, cables, sensors, measurement and interface computer cards)
Building computer software for control of measurements systems

Social competences:
Aware of responsibility during construction of computer supported systems and necessity of using of security mechanisms and methods facilitating exploitation of made constructions

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Evaluation form: Evaluation criteria:
Oral / written exam 50.1%-70.0% (3)
70.1%-90.0% (4)
from 90.1% (5)
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

Sources of knowledge in scope of computer support for experiment,
Analog and digital signals,
Analog to digital conversion,
Digital to analog conversion,
Digital circuits and interfaces,
Universal and dedicated computer cards,
Measurement sensors,
Vision systems,
Programming of computer measurement systems,
Ergonomic and safety in building and exploitation of experiments systems supported by computer.

## Course topics

Sources of knowledge in scope of computer support for experiment (e.g. books, proffesional magazines, documentations of producers e.t.c.),
Analog and digital signals, solutions for transfer both of them,
Analog to digital conversion:
- Parameters and configuration of A/C converters,
- Applications of A/C converters in experimental work,
Digital to analog conversion:
- Parameters and configuration of C/A converters,
- Applications of C/A converters in experimental work,
Digital circuits and interfaces:
- Types of digital circuits,
- Digital communication interfaces,
- Applications of digital circuits and interfaces in experimental work,
Universal and dedicated computer cards:
- Analog - digital converters,
- Digital - analog converters,
- Digital interfaces,

- Laboratory apparatus cards,
Measurement sensors:
- Sensors of electrical quantities,
- Sensors of chosen not electrical quantities,
- Signal conditioning,
Vision systems,
Programming of computer measurement systems:
- Graphical programming language LabVIEW,
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. W.Nawrocki. Komputerowe systemy pomiarowe. WKŁ, Warszawa 2007
2. W. Tłaczała. Środowisko LabVIEW w eksperymencie wspomaganym komputerowo. WNT, Warszawa 2020
3. M.Chruściel. LabVIEW w praktyce. BTC, Legionowo 2008
4. A.Jurkowski, M.Maćkowski, S.Michalak, J.Pająkowski, M.Wawrzyniak. Komputerowe systemy pomiarowe. Ćwiczenia laboratoryjne. WPP, Poznań 2007

Additional:
1. S. Tumański. Technika pomiarowa. PWN, Warszawa 2019
2. W.Nawrocki. Sensory i systemy pomiarowe. WPP, Poznań 2006
3. W.Tłaczała, L.Tykarski. Elektronika w eksperymencie fizycznym. WPW, Warszawa 1998.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 100 | 4,00 |
| Classes requiring direct contact with the teacher | 62 | 2,50 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 38 | 1,50 |