# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer measurement systems [S1EiT1E>KSP]

## Course

Field of study
Electronics and Telecommunications

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
elective

## Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

## Number of credit points

3,00

## Coordinators

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## Lecturers

## Prerequisites

Acquiring knowledge and skills in the field of configuring measuring and monitoring systems as well as their programming using programming languages and programming environments.

## Course objective

To present of the basic definitions and concepts of metrology, measurement methods and measurement equipment. To introduce students to the analysis and presentation of data and the determination of errors and measurement uncertainty. Practical carrying out laboratory experiments involving the preparation and execution of measurements.

## Course-related learning outcomes

Knowledge:
1. Student has a systematic knowledge, together with necessary mathematical background, of the fundamentals of metrology, which is necessary to measure the signal properties and the parameters of electronic and telecommunication systems components. Has knowledge of measurement methods, measurement equipment.
2. He/she has knowledge of devices and systems exploitation.

Skills:
1. Student is able to extract information from Polish or English language literature, databases and other sources. Is able to synthesize gathered information, draw conclusions, and justify opinions.
2. He/she is able to prepare a well-documented study, in English or in Polish, on problems related to electronics and telecommunication.
3. He/she is capable of studying autonomously.
4. He/she is able to measure typical parameters of signals, systems and devices, in particular voltage, electrical resistance, temperature, pressure and others used in measurin systems. Tudent is able to choose appropriate methods to measure given electrical quantities and parameters of signals and devices. He/she is able to plan and perform measurements and analyze the results.

Social competences:
1. Demonstrates responsibility and professionalism in solving technical problems.
2. Demonstrates responsibility for designed electronic and telecommunication systems. Is aware of the hazards they pose for individuals and communities if they are improperly designed or produced.
3. Is aware of the main challenges facing electronics and telecommunication in the 21st century.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Evaluation of student preparation for experiments, acceptance of students reports

## Programme content

• Structure of measurement systems.
Accuracy and dynamis of measurements. The New SI S2018 Systemn od Units.
• Functions of interfaces in measurement systems
• Serial interfaces: RS-232 and others (RS-530, RS-485).
• Interfaces for smart sensors.
• Parallel iterfaces: IEEE-488, IEC-625, GPIB, HPIB. Measurement systems using IEEE-488
• Other parallel interfaces: VXI i PXI
• Measurement systems using LAN
• Measurement systems using GSM/LTE for data transmition.
• Wireless data transmition for shoty distance in measurement systems: Bluetooth, ZigBee.
• Data acquisition boards. Virtual instruments.
• Conditioners
• Sensors and circuits for temperature, strain and pressure

## Course topics

none

## Teaching methods

lectures, laboratory experiments, consultations, individual study

## Bibliography

Basic
1. Computer-Based Measurement Systems, Nawrocki W., skrypt w formie maszynopisu wydany przez PP w ramach programu "Inżynier przyszlości" i finansowany przez Unie Europejska, Poznań, 2017.
2. Measurement Systems and Sensors, Nawrocki W., Artech House, London-Boston, wyd. 2, 2015.
3. Practical Data Acquisition for Instrumentation and Control Systems, Park J., Mackey S. Elsevier, 2003.
4 .Komputerowe systemy pomiarowe. Ćwiczenia laboratoryjne, Praca zbiorowa, Wyd. PP, Poznań, 2007.
Additional
1.Introduction to Quantum Metrology, Nawrocki W., Springer, Heidelberg, wyd. 2, 2019.
2. Komputerowe systemy pomiarowe, Nawrocki W., Wyd. Komunikacji i Łączności, Warszawa, 2006.
3. Sensory i systemy pomiarowe, Nawrocki W., Wyd. PP, Poznań, 2006.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 90 | 3,00 |
| Classes requiring direct contact with the teacher | 55 | 2,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 35 | 1,00 |