

# Metrology - course description

General information	
Course name	Metrology
Course ID	06.2-WE-AutP-M-Er
Faculty	<a href="#">Faculty of Computer Science, Electrical Engineering and Automatics</a>
Field of study	Automatic Control and Robotics
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2022/2023

Course information	
Semester	2
ECTS credits to win	4
Course type	obligatory
Teaching language	english
Author of syllabus	<ul style="list-style-type: none"><li>prof. dr hab. inż. Ryszard Rybski</li></ul>

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade

## Aim of the course

- to familiarize students with the basic issues of the theory of measurement and measure system and standards.
- to shape skills in the development of measurement results and estimation of errors and measurement uncertainty.
- to familiarize students with the methods and instruments for measuring selected electrical values.
- introduction to the classification, structure and properties of measurement systems.

## Prerequisites

Mathematical analysis, Principles of electrical engineering

## Scope

Basic concepts in metrology. Definition of measurement. Measurement scales and measurement units. Measurement methods and their accuracy. Errors, type A and type B measurement uncertainties, corrections, measurement results. Selected quantity standards. General information on mathematical modelling of objects and phenomena.

Measurements of selected electric quantities. Quantities characterizing electric signals. Static and dynamic properties of measuring instruments. Measuring voltages and currents. Methods and systems for measuring resistance and impedance. Measurements of frequency, period, time and phase shift angle. Power measurements. Electric signal recording.

Introduction to measurement systems. Measurement system definition. Classification of measurement systems. Configuring measurement systems. Interfaces. Examples of measurement system implementations.

## Teaching methods

Lecture: conventional lecture

Laboratory: laboratory exercises

## Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Names and characterizes measurement systems		<ul style="list-style-type: none"><li>an evaluation test</li></ul>	<ul style="list-style-type: none"><li>Lecture</li></ul>
Explains the methods and recognizes the devices used to measure selected electrical values		<ul style="list-style-type: none"><li>an evaluation test</li></ul>	<ul style="list-style-type: none"><li>Lecture</li></ul>
Applies measurement units and basic measurement units pattern standards		<ul style="list-style-type: none"><li>an evaluation test</li></ul>	<ul style="list-style-type: none"><li>Lecture</li></ul>
Asseses errors and measurement uncertainty		<ul style="list-style-type: none"><li>a quiz</li><li>an ongoing monitoring during classes</li></ul>	<ul style="list-style-type: none"><li>Laboratory</li></ul>
Develops measurement results		<ul style="list-style-type: none"><li>a quiz</li><li>an ongoing monitoring during classes</li></ul>	<ul style="list-style-type: none"><li>Laboratory</li></ul>

## Assignment conditions

Lecture – the credit is given for obtaining positive grades in written tests carried out at least once a semester.

Laboratory – to receive a final passing grade student has to receive positive grades in all laboratory exercises provided for in the laboratory syllabus.

Calculation of the final grade: lecture 50% + laboratory 50%

## Recommended reading

1. Tumanski S.: Principles of electrical measurement. Taylor & Francis, 2006
2. Bhargawa S.C: Electrical measuring instruments and measurements. CRC Press, 2012 3. Vetelino J., Reghu A.: Introduction to sensors. CRC Press, 2010

## Further reading

1. Skubis T.: Fundamentals of measurement results metrological interpretation. Published by Silesian University of Technology, Gliwice, 2004 (in Polish)

## Notes

Modified by dr hab. inż. Wojciech Paszke, prof. UZ (last modification: 11-04-2022 09:05)

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